

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Patent Application of:

Thomas J. LA ROSA *et al.*

Application Serial No.: 10/612,783

Filed: July 2, 2003

Title: Nucleic Acid Molecules and Other Molecules Associated With Plants and Their Uses
Thereof of Plant Improvement

Confirmation No.: 2839

Art Unit: 1638

Examiner: BUI, Phuong T.

Attorney Docket No.: 38-
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Appeal Brief under 37 C.F.R. § 41.37

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Sir:

This is an Appeal from the Final Rejection of claims in the above-captioned patent application mailed October 30, 2008 ("Final Action"). A Notice of Appeal was filed on January 30, 2009. Authorization to charge the official fees for this filing is given in the accompanying transmittal letter.

1. Real Party in Interest

The real party in interest is Monsanto Company, LLC a Delaware corporation with offices at 800 North Lindbergh Boulevard, St. Louis, Missouri 63167.

2. Related Appeals and Interferences

Appellants identify the following Board decisions, which may have a bearing on the instant appeal: U.S. Appln. No. 10/959,789, BPAI Appeal No. 2008-4080; U.S. Appln. No. 10/310,154, BPAI Appeal No. 2008-1662; U.S. Appln. No. 09/920,953, BPAI Appeal No. 2008-5017; U.S. Appln. No. 09/692,257, BPAI Appeal No. 2008-2258; U.S. Appln. No. 09/237,183, BPAI Appeal No. 2008-2045; U.S. Appln. No. 09/199,129, BPAI Appeal No. 2008-1235; U.S. Appln. No. 09/684,016, BPAI Appeal No. 2008-2230; U.S. Appln. No. 09/552,087, BPAI Appeal No. 2008-2456; U.S. Appln. No. 09/654,617, BPAI Appeal No. 2003-1744; U.S. Appln. No. 09/620,392, BPAI Appeal No. 2003-1746; U.S. Appln. No. 09/540,232, BPAI Appeal No. 2003-1137; U.S. Appln. No. 09/440,687, BPAI Appeal No. 2003-1504; U.S. Appln. No. 09/565,240, BPAI Appeal No. 2003-1135; U.S. Appln. No. 09/540,215, BPAI Appeal No. 2003-0996; U.S. Appln. No. 09/552,087, BPAI Appeal No. 2004-1772; and U.S. Appln. No. 09/206,040, BPAI Appeal No. 2002-0078. Copies of the Board's decisions in these Appeals are also attached hereto in the Related Cases section of the Appendix.

Appellants also identify the following pending appeals before the Board, which may have a bearing on the instant appeal: Appln. No. 11/329,175, U.S. Appln. No. 11/520,715, U.S. Appln. No. 11/329,160, U.S. Appln. No. 11/330,083, U.S. Appln. No. 09/976,054, U.S. Appln. No. 10/438,246; U.S. Appln. No. 11/239,592, U.S. Appln. No. 11/314,006, and U.S. Appln. No. 11/313,816.

3. Status of Claims

Claims 1-2 and 9 through 13 are pending. Claim 4 was cancelled without prejudice to, or disclaimer of, the subject matter claimed therein in the Amendment and Response to Final Office action dated December 29, 2008. Claims 3, 5 through 8, and 14 through 30 were cancelled without prejudice to, or disclaimer of, the subject matter claimed therein in the Amendment and Response to Non-Final Office action dated on January 8, 2008. Claims 1-2 and 9 through 13 stand finally rejected under 35 U.S.C. § 101. Claims 1-2 and 9 through 13 also stand finally

rejected under 35 U.S.C. § 112, first paragraph. Appellants appeal the rejections of Claims 1-2 and 9 through 13.

4. Status of Amendments

Appellants submitted an Amendment on December 29, 2008 (“Amendment”) in response to the Final Action mailed October 30, 2008. The Advisory Action submitted January 1, 2009 (“Advisory Action”), indicated that for the purposes of appeal the amendment would be entered. The Advisory Action further indicated that the rejection of Claims 1-2 and 9 through 13 under 35 U.S.C. § 112, second paragraph, was overcome by the Amendment.

5. Summary of Claimed Subject Matter

A. Independent Claim 1: The claimed subject matter of independent claim 1 is directed to a recombinant DNA construct comprising the nucleic acid sequence of SEQ ID: 3366 or the complement thereof. Specification at page 6, lines 6-7; and the Sequence Listing.

B. Independent Claim 2: The claimed subject matter of independent claim 2 is directed to a recombinant DNA construct comprising a polynucleotide encoding a polypeptide having an amino acid sequence comprising SEQ ID: 6915. *Id.* at page 14, lines 20-22; and the Sequence Listing.

C. Independent Claim 9: The claimed subject matter of independent claim 9 is directed to an isolated nucleic acid molecule comprising the nucleic acid sequence that exhibits at least 90% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID: 3366 or the complement thereof. *Id.* at page 6, lines 6-7; at page 14, lines 18-19; and the Sequence Listing.

ii. Dependent Claim 10: The claimed subject matter of dependent claim 10 is directed to an isolated nucleic acid molecule comprising the nucleic acid sequence that exhibits at least 95% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID: 3366 or the complement thereof. *Id.* at page 6, lines 6-7; at page 14, lines 18-19; and the Sequence Listing.

iii. Dependent Claim 11: The claimed subject matter of dependent claim 11 is directed to an isolated nucleic acid molecule comprising the nucleic acid sequence that exhibits

at least 98% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID: 3366 or the complement thereof. *Id.* at page 6, lines 6-7; at page 14, lines 18-19; and the Sequence Listing.

iv. Dependent Claim 12: The claimed subject matter of dependent claim 12 is directed to an isolated nucleic acid molecule comprising the nucleic acid sequence that exhibits at least 99% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID: 3366 or the complement thereof. *Id.* at page 6, lines 6-7; at page 14, lines 18-19; at page 82, lines 17-18; and the Sequence Listing.

v. Dependent Claim 13: The claimed subject matter of dependent claim 13 is directed to an isolated nucleic acid molecule comprising the nucleic acid sequence that exhibits 100% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID: 3366 or the complement thereof. *Id.* at page 6, lines 6-7; at page 35, lines 23; and the Sequence Listing.

A copy of the claims on appeal is attached hereto in the Claims Appendix.

6. Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection to be reviewed in this Appeal are:

- (a) pending claims 1-2 and 9 through 13 stand rejected under 35 U.S.C. § 101 for allegedly lacking by either a substantial, specific asserted utility or a well established utility; and
- (b) pending claims 1-2 and 9 through 13 stand rejected under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the enablement requirement.

7. Argument

A. Summary of Appellants' Position

Appellants have provided specific, substantial, credible, and well-established utilities for the claimed nucleic acid sequence, SEQ ID NO: 3366, which exhibits a strong correlation to a number of cytochrome p450 family members, such as Accession No. AY050980 and Accession No. AY091446. Appellants have further disclosed that the claimed polypeptide, SEQ ID NO: 6915, encodes for a cytochrome P450 polypeptide. Appellants disclose benefits associated with the claimed nucleic acid sequence and polypeptide, for example, to provide defense against

herbivorous insects, to provide for the biosynthesis of plant growth hormones, such as gibberellins, cytokinins, auxins, ethylene and abscisic acid, and to provide for tolerance to plant herbicides. The disclosed utilities are specific, not vague or unknown, and represent a “real world” or substantial benefit. Appellants have provided specific, substantial, credible, and well-established utilities for the claimed nucleic acid molecules. Because the claimed nucleic acid sequence and polypeptide provide at least these benefits, they satisfy the utility requirement of 35 U.S.C. § 101. Further, because the specification teaches how to make and use those nucleic acid molecules for the disclosed utilities, the claimed nucleic acid molecules also satisfy the enablement requirement of 35 U.S.C. § 112.

B. The Claimed Nucleic Acid Molecules Have Utility Under 35 U.S.C. § 101

The Examiner rejected Claims 1-2 and 9 through 13 under 35 U.S.C. § 101 because the claimed invention allegedly lacks either a substantial, specific asserted utility or a well established utility. Final Action at page 3. Appellants disagree.

In *In re Fisher*, the Federal Circuit reiterated that the “basic *quid pro quo* contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with *substantial utility*.” *In re Fisher*, 421 F.3d 1365, 1371 (Fed. Cir. 2005) (citing *Brenner v. Manson*, 383 U.S. at 534-35, 1966) (emphasis in original). The Court noted that since *Brenner* “our predecessor court, the Court of Customs and Patent Appeals, and this court have required a claimed invention to have a specific and substantial utility to satisfy § 101.” *Id.* Furthermore, an invention need only provide one identifiable benefit to satisfy 35 U.S.C. § 101. See *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 958 (Fed. Cir. 1983) (“when a properly claimed invention meets at least one stated objective, utility under section 101 is clearly shown”). “[A] ‘rigorous correlation’ need not be shown in order to establish practical utility; ‘reasonable correlation’ is sufficient.” See, *Fujikawa v. Wattanasin*, 93 F.3d 1559, 1565 (Fed. Cir. 1996), emphasis added. “An Applicant can establish this reasonable correlation by relying on statistically relevant data documenting the activity of the compound or composition, arguments or reasoning, documentary evidence ... or any combination thereof.” M.P.E.P. § 2107.03, at page 2100-34.

Although the Supreme Court has not defined the meaning of the terms “specific” and “substantial,” the Federal Circuit has identified a framework for the kind of disclosure an application could contain to establish a specific and substantial utility. *In re Fisher*, 421 F.3d at 1371. First, the Court indicated that, to provide a substantial utility, the specification should disclose a utility such that “one skilled in the art can use a claimed discovery in a manner which provides some *immediate benefit to the public*.” *Id.* (emphasis in original). Second, a specific utility can be disclosed by discussing “a use which is not so vague as to be meaningless,” that is that the claimed invention “can be used to provide a well-defined and particular benefit to the public.” *Id.*

The Patent Office must accept a stated utility by an applicant unless the Office has evidence or sound scientific reasoning to rebut the assertion of utility. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). “[W]hen a patent application claiming a nucleic acid asserts a specific, substantial, and credible utility, and bases the assertion upon homology to existing nucleic acids or proteins having an accepted utility, the asserted utility must be accepted by the examiner unless the Office has sufficient evidence or sound scientific reasoning to rebut such an assertion.” Federal Register 66(4):1096, Utility Guidelines (2001). Moreover, the Patent Office “has the initial burden of challenging a presumptively correct assertion of utility in the disclosure.” *In re Brana*, 51 F.3d 1560, 1567 (Fed. Cir. 1995). Accordingly, the utilities asserted in the specification must be accepted as factually sound unless the Office cites information that undermines the credibility of the assertion. *Id.* An Examiner “must do more than merely question operability – [he] must set forth factual reasons which would lead one skilled in the art to question the objective truth of the statement of operability.” *In re Gaubert*, 524 F.2d 1222, 1224-25 (C.C.P.A. 1975) (emphasis in original); M.P.E.P. § 706.03(a)(1) (“Office personnel are reminded that they must treat as true a statement of fact made by an applicant in relation to an asserted utility, unless countervailing evidence can be provided...”). Here, the Office has not met this burden.

(i) The recombinant DNA constructs of claim 1 have patentable utility.

Claim 1 is separately patentable under the requirements of 35 U.S.C. § 101. Claim 1 is directed to, *inter alia*, a recombinant DNA construct comprising a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof. Appellants have provided a specific, substantial and well-established utility for the claimed recombinant DNA construct of claim 1.

(a) *The Specification recites SEQ ID NO: 3366 as encoding a cytochrome P450*

At the outset, Table 1 indicates that SEQ ID NO: 3366 is a member of the cytochrome P450 family and exhibits a strong correlation to a number of cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446. Alone, this is a substantial, specific, and well-established utility and is sufficient to satisfy the utility requirement under 35 U.S.C. § 101.

The Examiner acknowledges that SEQ ID NO: 3366 encodes a cytochrome P450 protein.¹ Specifically, Table 1 in the specification recites that SEQ ID NO: 3366 is homologous to a cytochrome P450 protein from *Arabidopsis thaliana*. See e.g., Response submitted December 29, 2008 at pages 4, 5, and 7, Response submitted July 14, 2008 at page 7, 8 and 9. Further, the Examiner acknowledges that "at least the following sequences exhibit a greater than 54% percent identity to SEQ ID NO: 3366 together with a well-established utility as a cytochrome P450 protein: Accession No. NM118043, Accession No. AY091446, Accession No. AY050980, Accession No. AB122149, Accession No. NM202845, Accession No. NM123902, Accession No. NM180805, and Accession No. AB122150." Final Action at page 5, lines 7-12.

Moreover, as provided in Werck-Reichhart *et al.*, the 54% homology to a cytochrome c P450 protein recited in Table 1 is more than enough to identify SEQ ID NO: 3366 as a cytochrome P450 protein.² Specifically, Werck-Reichhart recites that "[s]equence identity among P450 proteins is often extremely low and may be less than 20% and there are only three absolutely conserved amino acids." Werck-Reichhart at page 2, 1st column line 50 to 2nd column line 1. Further, according to Werck-Reichhart, the amino-acid sequence of the cytochrome P450 family is "extremely diverse, with levels of identity as low as 16% in some cases." *Id.* at abstract. As set forth in the Advisory Action at page 2, the Examiner apparently agrees with this and

¹ In the Non-Final Office Action mailed March 12, 2008 at page 2, the Examiner asserts that "[s]ince SEQ ID NO: 3366 was first disclosed in the instant application, Applicants date of priority benefit is July 2, 2003." Solely in order to facilitate prosecution, Appellants are not challenging this priority date for the purposes of this appeal, but expressly reserve the right to do so at a later time.

² Werck-Reichhart *et al.* "Cytochromes P450: a success story," *Genome Biology*, 1 reviews, 3003.1-3003.9, at page 3002.2, December 8, 2000 (hereinafter "Werck-Reichhart").

acknowledges that SEQ ID NO: 3366 has characteristics which are compatible with the cytochrome P450 family. However, while the Examiner acknowledges that SEQ ID NO: 3366 “possesses the hallmark motifs of P450”, the Examiner further asserts that identifying SEQ ID NO: 3366 as a cytochrome P450 “does not establish utility.” Advisory Action at page 2, line 5 (internal quotations omitted). Appellants disagree. As detailed below, one of ordinary skill in the art would recognize the utility that Appellants have established upon identifying SEQ ID NO: 3366 as encoding a member of the cytochrome P450 superfamily.

(b) *Nucleic acids encoding Cytochrome P450 proteins have specific disclosed utilities*

Even in the absence of the identified homology to specific a specific class and family of P450 as discussed below, one of ordinary skill in the art would recognize the utility of P450 family members. For example, the specification recites that “polypeptides may be produced in transgenic plants to provide plants having improved phenotypic properties and/or improved response to stressful environmental conditions.” Specification at page 15, lines 13-15. The specification also recites that “[p]olypeptides of interest for improving plant tolerance to effects of plant pests or pathogens include . . . polypeptides involved in biosynthesis of terpenoids or indole for production of bioactive metabolites to provide defense against herbivorous insects.” Specification at page 18, lines 1-6 (emphasis added). The role of P450 proteins in the biosynthesis of defense chemicals in plants was well known and would have been readily appreciated by persons of ordinary skill in the art.³ The specification further recites that

[p]olypeptides involved in production of substances that regulate the growth of various plant tissues are of interest in the present invention and may be used to provide transgenic plants having altered morphologies and improved plant growth and development profiles leading to improvements in yield and stress response. Of particular interest are polypeptides involved in the biosynthesis of plant growth hormones, such as gibberellins, cytokinins, auxins, ethylene and abscisic acid.

Specification at page 19, lines 18-23 (emphasis added). Here, one of skill in the art would recognize the utility of SEQ ID NO: 3366 in the synthesis of plant growth regulating substances.

³ See e.g., Werck-Reichhart at page 3003.3, 2nd column at lines 28-34.

For example, Appellants disclosed significant homology between SEQ ID NO: 3366 and NM_118043⁴ which “[e]ncodes a protein with ABA [abscisic acid] 8'-hydroxylase activity, involved in ABA catabolism . . . play[s] an important role in determining the ABA levels in dry seeds . . . involved in postgermination growth . . . [and] [o]verexpression . . . leads to a decrease in ABA levels and a reduction in after-ripening period to break dormancy.”⁵ One of skill in the art would also recognize the utility of P450 proteins as “[p]olypeptides of interest for producing plants having tolerance to plant herbicides.”⁶ Specification at page 20, lines 3-4.

These utilities alone are specific, not vague or unknown, and represent a “real world” or substantial benefit. Because the claimed nucleic acid molecules provide at least these benefits, they satisfy the utility requirement of 35 U.S.C. § 101.

(c) *Nucleic acid sequences encoding Cytochrome P450 proteins have immediate and specific benefit*

The Examiner ignores the specification and the knowledge of one of ordinary skill in the art in concluding that SEQ ID NO: 3366 can be characterized as a member of the P450 superfamily without a specific, substantial and well-established utility. As discussed in Werck-Reichhart and known to persons of ordinary skill in the art, protein homology can provide significant information beyond the identification of membership in a family. Specifically, as set forth in Werck-Reichhart, members of the P450 superfamily can be further distinguished as members of a family and a subfamily. Further, such distinctions form the basis of P450 nomenclature where “[t]he root symbol CYP is followed by a number for families (generally groups of proteins with more than 40% amino-acid sequence identity, of which there are over 200), a letter for subfamilies (greater than 55% identity) and a number for the gene.” Werck-Reichhart at page 3003.1, first column, lines 5-9. Here, Appellants have disclosed that SEQ ID

⁴ See Information Disclosure Statement submitted July 14, 2008

⁵ Annotation of NM_11803, publically available on NCBI as of August 20, 2002.

⁶ See also, Werck-Reichhart at page 3003.3, 2nd column, at lines 39-41 and internal cited reference number 28 (Werck-Reichhart D, Hahn H, Didierjean L: Cytochromes P450 for engineering herbicide tolerance. Trends Plant Sci 2000, 5:116-123).

NO: 3366 shares more than 54% identity to members of the cytochrome 707 family⁷, which is a much higher percent identity than that suggested by Werck-Reichhart. Further, it is known to persons of skill in the art that members of this family are involved in the gibberellin biosynthesis pathway. Therefore, the Examiner's assertion that "[h]aving 54% identity to a known P450 does not establish utility" is incompatible with the teachings of the art. Advisory Action at page 2, line 3. That is, members of P450 families can be identified based on homology and functions of P450 families are conserved.

The Examiner further acknowledges that SEQ ID NO: 3366 "possess[es] a motif which prior art states is important as a ligand to heme iron for P450 family" but asserts that it "does not provide guidance as to how SEQ ID NO: 3366 should be used to achieve a utility from the laundry list of utilities (sic) applicable to virtually all proteins in [the] (sic) specification." Advisory action at page 2, lines 5-7. This assertion is both factually and legally incorrect. In making this conclusory statement, the Examiner ignores that the "most conserved structural features are related to heme binding and common catalytic properties." Werck-Reichhart at abstract (emphasis added). Thus by ignoring the conserved catalytic properties, in error, without support and in contrast to the teachings of Werck-Reichhart, the Examiner asserts that one of skill in the art lacks guidance how utility may be achieved.

- (d) *Appellants disclose how nucleic acid sequences encoding Cytochrome P450 can be used to achieve an immediate and specific benefit*

The Examiner alleges that "[a]bsent guidance as to how SEQ ID NO:3366 can be used to achieve an immediate and specific benefit, the claimed invention lacks substantial, specific asserted utility. The laundry list of possible utilities for all 12,046 sequences disclosed in the specification does not obviate this rejection because it is unclear which of the above utilities is applicable to SEQ ID NO:3366, and how SEQ ID NO:3366 should be used to achieve its utility." Final Action at page 3, lines 13-15. Appellants disagree. The Examiner apparently suggests that

⁷ Accession numbers: NM_118043, AY091446, AY050980, AB122149, NM_202845, NM_123902, NM_180805 and AB122150. Information Disclosure Statement filed July 14, 2008.

one of skill in the art would be unable to distinguish which of the disclosed utilities are applicable based on the disclosure in the specification that SEQ ID NO: 3366 is a cytochrome P450 protein. As noted above, and in contrast to the Examiner's unsupported assertion that P450s are involved in "virtually all plant functions" and a person of ordinary skill in the art would readily recognize that P450 proteins exhibit utility in at least plant growth factor biosynthesis, herbicide resistance and defense against herbivorous insects. *See, e.g.* Werck-Reichhart at abstract. These utilities are also recited in the specification. Specification at page 18, lines 1-6. Moreover, the specification recites methods to increase the expression of SEQ ID NO: 3366. *See e.g.* Specification at page 9, lines 3-5, at page 13, lines 6-8, . Further, the specification recites methods to decrease the expression of SEQ ID NO: 3366. *See e.g.* Specification at page 13, lines 10-11, at page 31, lines 20-23. With this, Appellants have disclosed at least one identifiable use which can be used to provide a well-defined and particular benefit to the public.

(e) *P450 Proteins sharing 54% or less identity are known to share the same function*

The Examiner asserts that "[t]here are no working examples or recognition by the state of the art at filing to evidence that two proteins having 54% identify would have the same function." Advisory Action at page 2. Appellants disagree. In contrast to the Examiner's assertions, at the time of filing, it was recognized that very little homology was necessary among P450 family members for them to metabolize phenylurea compounds. For example, Robineau *et al.*, in 1998 describe the metabolism of the phenylurea compound chlortoluron by CYP76BA (Genbank ID O23976).⁸ Robineau *et al.* further identify P450s CYP1A1, CYP3A4, CYP73A1, CYP81B1 and CYP76B1 as "hav[ing] previously been reported to metabolize chlortoluron." Robineau *et al.* at page 1054, 2nd column. Belonging to four different P450 families and based on the established nomenclature noted above, one of skill in the art would recognize that these four different families share less than about 40% sequence identity. *See* Werck-Reichhart at

⁸ Robineau T, Batard Y, Nedelkina S, Cabello-Hurtado F, LeRet M, Sorokine O, Didierjean L, Werck-Reichhart D. The chemically inducible plant cytochrome P450 CYP76B1 actively metabolizes phenylureas and other xenobiotics. *Plant Physiol.* 1998 Nov.;118(3):1049-56.

page 3003.1, first column, lines 5-9. Therefore, in direct contradiction to the Examiner's assertion, it was well established in the art that homologies at least as low as 40% share function. With this, one of skill in the art would recognize the utility of a cytochrome P450 as disclosed in the specification.

The utilities provided for SEQ ID NO: 3366 are credible, substantial, and well-established; they are neither vague nor impractical. Furthermore, the provided utilities are immediately apparent and available without the need for further research. As such, one of ordinary skill in the art would recognize that the claimed nucleic acid molecules provide at least one identifiable benefit and therefore satisfy the 35 U.S.C. § 101 utility requirement. Appellants need only establish a single utility to satisfy 35 U.S.C. § 101, and have done so in the present application.

The Examiner's failure to accept the utilities cited in the specification is contrary to established law. The Patent Office must accept a stated utility by an applicant unless the Office has evidence or sound scientific reasoning to rebut the applicant's assertion. In the instant case the Examiner provides no evidence or sound scientific reasoning to rebut the utilities stated in the application.

(ii) The recombinant DNA construct encoding a polypeptide of claim 2 has patentable utility.

Appellants have provided a specific, substantial and well-established utility for the claimed recombinant DNA construct encoding a polypeptide of claim 2. Moreover, Claim 2 is separately patentable under the utility requirement of § 101.

(a) *The Specification recites SEQ ID NO: 6915 as a cytochrome P450 polypeptide*

The Examiner acknowledges that SEQ ID NO: 6915 encodes a cytochrome P450 protein. Specifically, Table 1 in the specification recites that SEQ ID NO: 6915 is homologous to a cytochrome P450 protein from *Arabidopsis thaliana*. See e.g., Response submitted December 29, 2008 at pages 4, 5, and 7, Response submitted July 14, 2008 at page 7, 8 and 9. Further, as recited in the Information Disclosure Statement submitted on July 14, 2008, at least the following sequences exhibit a greater than 54% percent identity to SEQ ID NO: 6915 together with a well-established utility as a cytochrome p450 protein: Accession No. NP001047855,

Accession No. Q05JG2, Accession No. NP567581, Accession No. NP851136, Accession No. CAA16713, Accession No. NP974574, Accession No. NP199347, Accession No. NP566628, Accession No. NP974574, Accession No. NP180473, Accession No. AAZ23260, Accession No. BAD38475, and Accession No. Q09J78.” Response submitted July 14, 2008 at page 8, lines 1-7.

As above, the Examiner acknowledges that the level of homology unambiguously identifies SEQ ID NO: 6915 as a cytochrome P450 protein supported by the disclosure of Werck-Reichhart. In particular, the Examiner acknowledges that Appellants identified the “Glu Thr Met Arg” at amino acid positions 339-342 as well as “Pro Leu Pro Pro” at amino acid positions 38-41 which are noted by Werck-Reichhart as being a hallmarks of cytochrome p450 proteins.” Final Action at page 6, lines 19-21. While the Examiner acknowledges that SEQ ID NO: 6915 “possesses the hallmark motifs of P450”, the Examiner further asserts that identifying SEQ ID NO: 6915 as a cytochrome P450 “does not establish utility.” Advisory Action at page 2, line 5, (internal quotations omitted). Appellants disagree. As detailed above, one of ordinary skill in the art would recognize the utility that Appellants have established upon identifying SEQ ID NO: 6915 as a member of the family cytochrome P450.

For at least the reasons stated in 7(B)(i)(a), 7(B)(i)(b), 7(B)(i)(c), 7(B)(i)(d), and 7(B)(i)(e), Appellants have established at least one identifiable benefit and therefore satisfy the 35 U.S.C. § 101 utility requirement. Appellants need only establish a single utility to satisfy 35 U.S.C. § 101, and have done so in the present case.

(iii) The isolated nucleic acid molecules of claims 9-13 have patentable utility.

Appellants have provided a specific, substantial and well-established utility for the claimed isolated nucleic acid molecules of claims 9-13. Moreover, claims 9-13 are separately patentable under the utility requirement of § 101.

Claims 9-13 are directed to, *inter alia*, substantially purified nucleic acid molecules comprising a nucleic acid sequence that shares between 100% and 90% sequence identity with a nucleic acid sequence of SEQ ID NO: 3366 or the complement thereof. For at least the reasons stated in Sections 7(B)(i)(b), 7(B)(i)(c), 7(B)(i)(d), and 7(B)(i)(e) above, the nucleic acid molecules of claims 9-13 also meet the utility requirement.

(a) The isolated nucleic acid molecules of claim 9 have patentable utility.

Claim 9 is separately patentable under the utility requirement of 35 U.S.C. § 101. A substantially purified nucleic acid molecule comprising a nucleic acid sequence that shares between 100% and 90% sequence identity with a nucleic acid sequence of SEQ ID NO: 3366 or the complement thereof would reasonably be expected to exhibit the disclosed utilities.

As discussed above, at the time of filing, as disclosed in the specification and discussed in 7(B)(i)(a), 7(B)(i)(b), 7(B)(i)(c), 7(B)(i)(d) and 7(B)(i)(e), SEQ ID NO: 3366 would reasonably be expected, by one of ordinary skill in the art, to translate to a cytochrome P450 protein from *Oryza sativa*. It is also well understood in the biochemical arts that a sequence comparison for an unknown nucleic acid molecule that results in 90% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule. Therefore, claim 9 independently has a substantial and credible utility because it exhibits a reasonable correlation to a nucleic acid sequence encoding a cytochrome P450 protein and in addition to the utilities asserted above, can be used to isolate genes, map genes, and determine gene function associated with this protein, or a homologue thereof.

(b) The isolated nucleic acid molecules of claim 10 have patentable utility.

Claim 10 is separately patentable under the requirements of 35 U.S.C. § 101. An isolated nucleic acid molecule comprising a nucleic acid sequence that shares between 100% and 95% sequence identity with a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof would also reasonably be expected to exhibit the disclosed utilities. As discussed in 7(B)(i)(a), 7(B)(i)(b), 7(B)(i)(c), 7(B)(i)(d) and 7(B)(i)(e) above, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 90% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule. Therefore, it would be apparent to one of ordinary skill in the art that a sequence comparison for a nucleic acid molecule that results in 95% or greater nucleotide identity with a nucleic acid molecule known to correlate to a cytochrome P450 protein would provide an even more predictable correlation for the function of such a nucleic acid molecule. As such, Appellants

have also satisfied the utility requirement with respect to dependent claim 10.

- (c) The isolated nucleic acid molecules of claim 11 have patentable utility.

Claim 11 is separately patentable under the requirements of 35 U.S.C. § 101. An isolated nucleic acid molecule comprising a nucleic acid sequence that shares between 100% and 98% sequence identity with a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof would reasonably be expected to exhibit the disclosed utilities. In line with the reasoning discussed in Sections 7.B.(iii)(a) and 7.B.(iii)(b) above, it would be even more readily apparent to one of ordinary skill in the art that a sequence comparison for a nucleic acid molecule that results in 98% or greater nucleotide identity with a nucleic acid molecule known to correlate to a cytochrome P450 protein in *Oryza sativa* would provide an even more predictable correlation for the function of such a nucleic acid molecule. As such, Appellants have also satisfied the utility requirement with respect to dependant claim 11.

- (d) The isolated nucleic acid molecules of claim 12 have patentable utility.

Claim 12 is separately patentable under the requirements of 35 U.S.C. § 101. An isolated nucleic acid molecule comprising a nucleic acid sequence that shares between 100% and 99% sequence identity with a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof would reasonably be expected to exhibit the disclosed utilities. In line with the reasoning discussed in Sections 7.B.(iii)(a), 7.B.(iii)(b) and 7.B.(iii)(c) above, it is especially apparent to one of ordinary skill in the art that a sequence comparison for a nucleic acid molecule that results in 99% or greater nucleotide identity with a nucleic acid molecule known to correlate to a cytochrome P450 protein in *Oryza sativa* would provide an even more predictable correlation for the function of such a nucleic acid molecule. As such, Appellants have also satisfied the utility requirement with respect to dependent claim 12.

- (e) The isolated nucleic acid molecules of claim 13 have patentable utility.

Claim 13 is separately patentable under the requirements of 35 U.S.C. § 101. An isolated nucleic acid molecule comprising a nucleic acid sequence that shares 100% sequence identity

with a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof would reasonably be expected to exhibit the disclosed utilities. The reasoning presented in Sections 7.B.(iii)(a), 7.B.(iii)(b), 7.B.(iii)(c) and 7.B.(iii)(d) above, taken to its ultimate conclusion, suggests to one of ordinary skill in the art that a sequence comparison for a nucleic acid molecule that results in 100% nucleotide identity with a nucleic acid molecule known to correlate to a cytochrome P450 protein in *Oryza sativa* would provide the most predictable correlation for the function of such a nucleic acid molecule. As such, Appellants have also satisfied the utility requirement with respect to dependent claim 13.

(iv) Conclusion

Based on the foregoing, Appellants submit that the claimed nucleic acid molecules and transformed cells have specific, substantial, and well-established utilities, and request that the Board reverse the rejection of claims 1-2 and 9-13 under 35 U.S.C. § 101.

C. The Claimed Nucleic Acid Molecules Are Enabled Under 35 U.S.C. § 112

The Examiner has rejected claims 1-2 and 9-13 as not being enabled because the claimed invention is allegedly not supported by “a specific, substantial and credible asserted utility or a well established utility” and “one skilled in the art clearly would not know how to use the claimed invention.” Final Action at page 3, line 22 to page 4 line 2. The Examiner further asserts that “[a]bsent further guidance, one skilled in the art cannot make and use the claimed invention without undue experimentation.” *Id.* at page 4, line 22 - page 5, line 2. For at least the reasons presented in Sections 7(B)(i)(a)-(e), 7(B)(ii)(a), and 7(B)(iii)(a)-(e) above, Appellants have established specific, substantial, and well-established utilities for SEQ ID NO: 3366, and therefore one skilled in the art would know how to make and use the claimed invention.

The Examiner has not met the evidentiary burden to impose an enablement rejection. A specification that discloses how to use a claimed invention “must be taken as in compliance with the enabling requirement of the first paragraph of § 112 unless there is reason to doubt the objective truth of the statements contained therein.” *In re Brana*, 51 F.3d 1560, 1566, 34 U.S.P.Q.2d 1436, 1441 (Fed. Cir. 1995), *quoting In re Marzocchi*, 439 F.2d 220, 223, 169 U.S.P.Q. 367, 369 (C.C.P.A. 1971) (emphasis in original).

As the M.P.E.P. makes clear, “(t)he specification need not disclose what is well-known to those skilled in the art and preferably omits that which is well-known to those skilled and already available to the public.” M.P.E.P. § 2164.05(a). *See also, In re Buchner*, 929 F.2d 660, 661 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947 (1987); and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1463 (Fed. Cir. 1984). Furthermore, it is well-established patent jurisprudence that Applicants need not teach “conventional and well-known genetic engineering techniques.” *Ajinomoto Co. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000).

(i) Appellants have enabled the recombinant DNA construct of claims 1 and 2.

Claims 1 and 2 are each separately patentable under the requirements of 35 U.S.C. § 112. As previously stated, Claim 1 is directed to, *inter alia*, a recombinant DNA construct comprising a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof. Claim 2 is directed to, *inter alia*, a recombinant DNA construct comprising a polynucleotide that encodes a polypeptide having an amino acid sequence comprising SEQ ID NO: 6915. The Examiner bases the rejection on the claims for lack of enablement on the assertion that “neither the specification nor the state of the art at the time the invention was made provides guidance as to where the critical region(s) are, or what plant function SEQ ID NO: 3366 has so that its activity can be maintained.” Final Action at page 4, lines 19-22. Appellants disagree.

The enablement requirement is satisfied as long as the specification discloses at least one method for making and using the claimed invention that bears a reasonable correlation to the entire scope of the claim. MPEP § 2164.01(b); *Johns Hopkins University v. CellPro, Inc.*, 152 F.3d 1342, 1361, 47 USPQ2d 1705, 1719 (Fed. Cir. 1998). Appellants have satisfied this requirement as the specification describes numerous nucleic acid and amino acid sequences, including SEQ ID NO: 3366 and SEQ ID NO: 6915, and the preparation of constructs using these sequences. Specification at page 14, line 20 - page 15, line 21; page 24, line 21 - page 29, line 6; and Sequence Listing. Moreover, the specification provides sequence homology and percent identity evaluations with respect to SEQ ID NO: 3366 and SEQ ID NO: 6915. Specification at page 14, lines 14-19 and page 42, line 18 - page 44, line 20 and Table 1. With

this, one of skill in the art would have the ability to make and use the invention in a manner which is commensurate in scope with the claims without undue experimentation.

Moreover, contrary to the Examiner's assertion, Appellants are not required to verify the functionality of SEQ ID NO: 3366 in plants or prove to the Examiner "guidance as to where the critical region(s) are, or what plant function SEQ ID NO: 3366 has so that its activity can be maintained" as these requirements go beyond the scope of the claims. *Id. See CFMT, Inc. v. Yieldup International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003) ("[e]nablement does not require an inventor to meet lofty standards for success in the commercial marketplace. Title 35 does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment absent a claim limitation to that effect. Title 35 requires only that the inventor enable one of skill in the art to make and use the full scope of the claimed invention.") Appellants have enabled the full scope of the claimed invention and are required to do no more.

Furthermore, as set forth above in Section 7(B)(i), Werck-Reichhart provides detailed guidance regarding sequence identity and function in cytochrome P450 proteins. Specifically, Werck-Reichhart indicates that "[s]equence identity among P450 proteins is often extremely low and may be less than 20% and there are only three absolutely conserved amino acid." Werck-Reichhart at page 2, 1st column line 50 to 2nd column line 1. Moreover, the DNA sequence, SEQ ID NO: 3366, and the corresponding amino acid sequence, SEQ ID NO: 6915, contain structural motifs of cytochrome p450 proteins as set forth in Werck-Reichhart. For instance, SEQ ID NO: 6915 includes "Glu Thr Met Arg" at amino acid positions 339-342 as well as with "Pro Leu Pro Pro" at amino acid positions 38-41 which are noted by Werck-Reichhart as being a hallmarks of cytochrome p450 proteins.⁹ Werck-Reichhart at page 3003.2, second column, and Figures 1-2. Further, SEQ ID NO: 6915 includes the "Phe Gly Asn Gly Thr His Ser Cys Pro Gly" motif at amino acids positions 408 - 417 which contains the Cys residue which is described by Werck-

⁹ As set forth in Werck-Reichhart, a hallmark of cytochrome p450 proteins is a "Glu-X-X-Arg motif in helix K" and "cluster of prolines (Pro-Pro-X-Pro)." Werck-Reichhart *et al.* at page 3003.2, column 2, and Figures 1-2.

Reichhart as being important as a ligand to heme iron.¹⁰ *Id.* With this, Werck-Reichhart provides guidance regarding the structural motifs of cytochrome p450 proteins such that one of skill in the art would have the ability to practice the claimed invention without undue experimentation.

The Examiner's rejection of the claims because the specification allegedly fails to provide "guidance as to where the critical region(s) are, or what plant function SEQ ID NO: 3366 has so that its activity can be maintained" also disregards the standard of one of ordinary skill in the art. Given at least the teachings of the specification, one of ordinary skill in the art would have the ability to make nucleotide substitutions to SEQ ID NO: 3366 and amino acid substitutions to SEQ ID NO: 6915 without undue experimentation. Performing routine and well-known steps cannot create undue experimentation even if it is laborious. *See In re Angstadt*, 537 F.2d 498, 504, 190 U.S.P.Q. 214, 218-219 (C.C.P.A. 1976). However, the Examiner ignores this in rejecting the claims.

Appellants have provided considerable direction and guidance such that it is well within the level of ordinary skill in the art to practice the claimed invention without undue experimentation. For example, given the specification, one of skill in the art would recognize that degeneracy of the genetic code would account for nucleic acid molecules comprising different nucleotides but encoding for the same protein with the same function. Specification, for example, at page 14, lines 3-13. Moreover, one of skill in the art would also have the ability to modify the nucleic acid sequence of SEQ ID NO:3366 such that it would encode for a protein with conservative amino acid substitutions. Specification, for example, at page 22, line 12 - page 23, line 16. As provided in the specification, one of skill in the art would recognize that conservative amino acid substitution is based on a variety of well known factors and can be accomplished without undue experimentation. *Id.* For example, without being limited, one of skill in the art would have the ability to make conservative amino acid substitutions based on the charge, polarity, hydrophobicity, hydrophilicity, and relative side group of the amino acid. *Id.*

¹⁰ As set forth in Werck-Reichhart, a hallmark of cytochrome p450 proteins is a "(Phe-X-X-Gly-X-Arg-X-Cys-X-Gly), located on the proximal face of the heme just before the L helix, with the absolutely conserved cysteine that serves as fifth ligand to the heme iron." *Id.*

Additionally, one of skill in the art would recognize that changes to the critical region of a protein should be handled with caution as to avoid influencing the activity of the protein. *Id.*

It is submitted that Appellants have provided considerable direction and guidance, and has presented working examples such that it is well within the level of ordinary skill in the art to practice the invention without undue experimentation. The Examiner has not provided sufficient evidence to discredit the teaching in the specification. Rather, the Examiner suggests inapplicable and generalized observations.

(ii) **Appellants have enabled nucleic acid molecules having a nucleic acid sequence that exhibits 90% or higher identity to a nucleic acid sequence of SEQ ID NO: 3366.**

Claims 9-13 are directed to, *inter alia*, nucleic acid molecules that exhibit at least 90%, 95%, 98%, and 99%, respectfully, sequence identity with SEQ ID NO: 3366 or the complement thereof. For at least the reasons stated in Section 7(C)(i) above, the nucleic acid molecules of claims 9-13 satisfy the enablement requirement of 35 U.S.C. § 112, first paragraph.

(a) Appellants have enabled an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 90% sequence identity with SEQ ID NO: 3366 or the complete complement thereof.

Moreover, as discussed in Section 7(C)(i), based on the teachings of the specification as well as an at least 54% identity to a number of known cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446, one of ordinary skill in the art at the time the invention was made would have the ability to make and use the invention in a manner commensurate in scope with the claims without undue experimentation. Further, as confirmed by Werck-Reichhart, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 90% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule.

Independent claim 9 recite an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 90% sequence identity with SEQ ID NO:3366 or the complete complement thereof. One of ordinary skill in the art would recognize that the nucleic acid

molecules of claim 9 are members of the cytochrome P450 family. Therefore, claim 9 is independently enabled because one of skill in the art would have the ability to practice the invention without undue experimentation. Thus, dependent claim 9 satisfies the enablement requirement under 35 U.S.C. § 112, first paragraph.

- (b) Appellants have enabled an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 95% sequence identity with SEQ ID NO: 3366 or the complete complement thereof.

Moreover, as discussed in Section 7(C)(i), based on the teachings of the specification as well as an at least 54% identity to a number of known cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446, one of ordinary skill in the art at the time the invention was made would have the ability to make and use the invention in a manner commensurate in scope with the claims without undue experimentation. Further, as confirmed by Werck-Reichhart, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 95% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule.

Independent claim 10 recites an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 95% sequence identity with SEQ ID NO:3366 or the complete complement thereof. One of ordinary skill in the art would recognize that the nucleic acid molecules of claim 10 are members of the cytochrome P450 family. Therefore, claim 10 is independently enabled because one of skill in the art would have the ability to practice the invention without undue experimentation. Thus, dependent claim 10 satisfies the enablement requirement under 35 U.S.C. § 112, first paragraph.

- (c) Appellants have enabled an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 98% sequence identity with SEQ ID NO: 3366 or the complete complement thereof.

Moreover, as discussed in Section 7(C)(i), based on the teachings of the specification as well as an at least 54% identity to a number of known cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446, one of ordinary skill in the art at the

time the invention was made would have the ability to make and use the invention in a manner commensurate in scope with the claims without undue experimentation. Further, as confirmed by Werck-Reichhart, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 98% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule.

Independent claim 11 recites an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 98% sequence identity with SEQ ID NO:3366 or the complete complement thereof. One of ordinary skill in the art would recognize that the nucleic acid molecules of claim 11 are members of the cytochrome P450 family. Therefore, claim 11 is independently enabled because one of skill in the art would have the ability to practice the invention without undue experimentation. Thus, dependent claim 11 satisfies the enablement requirement under 35 U.S.C. § 112, first paragraph.

- (d) Appellants have enabled an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 99% sequence identity with SEQ ID NO: 3366 or the complete complement thereof.

Moreover, as discussed in Section 7(C)(i), based on the teachings of the specification as well as an at least 54% identity to a number of known cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446, one of ordinary skill in the art at the time the invention was made would have the ability to make and use the invention in a manner commensurate in scope with the claims without undue experimentation. Further, as confirmed by Werck-Reichhart, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 99% or greater nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule.

Independent claim 12 recites an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 98% sequence identity with SEQ ID NO:3366 or the complete complement thereof. One of ordinary skill in the art would recognize that the nucleic acid molecules of claim 12 are members of the cytochrome P450 family. Therefore, claim 12 is

independently enabled because one of skill in the art would have the ability to practice the invention without undue experimentation. Thus, dependent claim 12 satisfies the enablement requirement under 35 U.S.C. § 112, first paragraph.

- (e) Appellants have enabled an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits 100% sequence identity with SEQ ID NO: 3366 or the complete complement thereof.

Claim 13 is separately patentable under the requirements of 35 U.S.C. § 112, first paragraph. As discussed in Section 7(C)(i), based on the teachings of the specification as well as an at least 54% identity to a number of known cytochrome P450 family members, such as Accession No. AY050980 and Accession No. AY091446, one of ordinary skill in the art at the time the invention was made would have the ability to make and use the invention in a manner commensurate in scope with the claims without undue experimentation. Further, as confirmed by Werck-Reichhart, it is well established that a sequence comparison for an unknown nucleic acid molecule that results in 100% nucleotide identity with a nucleic acid molecule having a known function is a reasonably reliable method for predicting the function of that unknown nucleic acid molecule.

Independent claim 13 recites an isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits 100% sequence identity with SEQ ID NO:3366 or the complete complement thereof. Given the analysis set forth above, one of ordinary skill in the art would recognize that the nucleic acid molecules of claim 13 are members of the cytochrome P450 family. Therefore, claim 9 is independently enabled because one of skill in the art would have the ability to practice the invention without undue experimentation. Thus, dependent claim 13 satisfies the enablement requirement under 35 U.S.C. § 112, first paragraph.

Based on the foregoing, Appellants submit that the rejection of claims 1-2 and 9-13 under 35 U.S.C. § 112, first paragraph, has been overcome by the arguments set forth above with respect to the rejection under 35 U.S.C. § 101. Further, Appellants submit that the rejection of claims 1-2 and 9-13 under 35 U.S.C. § 112, first paragraph for a lack of enablement commensurate with the claims has been overcome. Therefore, Appellants request that the Board reverse all rejections of claims 1-2 and 9-13 under 35 U.S.C. § 112, first paragraph.

CONCLUSION

In view of the foregoing, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejections and that the subject application be allowed forthwith.

Respectfully submitted,

/David R. Marsh/

Date: April 30, 2009

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CLAIMS APPENDIX

1. A recombinant DNA construct comprising a polynucleotide comprising a nucleic acid sequence of SEQ ID NO: 3366 or the complete complement thereof.
2. A recombinant DNA construct comprising a polynucleotide encoding a polypeptide having an amino acid sequence comprising SEQ ID NO: 6915.
9. An isolated nucleic acid molecule comprising a nucleic acid sequence that exhibits at least 90% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID NO:3366 or the complete complement thereof.
10. The isolated nucleic acid molecule of claim 9, wherein said nucleic acid sequence exhibits at least 95% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID NO:3366 or the complete complement thereof.
11. The isolated nucleic acid molecule of claim 10, wherein said nucleic acid sequence exhibits at least 98% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID NO:3366 or the complete complement thereof.
12. The isolated nucleic acid molecule of claim 11, wherein said nucleic acid sequence exhibits at least 99% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID NO: 3366 or the complete complement thereof.
13. The isolated nucleic acid molecule of claim 12, wherein said nucleic acid sequence shares 100% sequence identity with a nucleic acid sequence selected from the group consisting of SEQ ID NO: 3366 or the complete complement thereof.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

Attached are copies of Decisions on Appeal that issued in the following applications:

1. U.S. Appln. No. 10/959,789, BPAI Appeal No. 2008-4080
2. U.S. Appln. No. 10/310,154, BPAI Appeal No. 2008-1662
3. U.S. Appln. No. 09/920,953, BPAI Appeal No. 2008-5017
4. U.S. Appln. No. 09/692,257, BPAI Appeal No. 2008-2258
5. U.S. Appln. No. 09/237,183, BPAI Appeal No. 2008-2045
6. U.S. Appln. No. 09/199,129, BPAI Appeal No. 2008-1235
7. U.S. Appln. No. 09/684,016, BPAI Appeal No. 2008-2230
8. U.S. Appln. No. 09/552,087, BPAI Appeal No. 2008-2456
9. U.S. Appln. No. 09/654,617, BPAI Appeal No. 2003-1744
10. U.S. Appln. No. 09/620,392, BPAI Appeal No. 2003-1746
11. U.S. Appln. No. 09/540,232, BPAI Appeal No. 2003-1137
12. U.S. Appln. No. 09/440,687, BPAI Appeal No. 2003-1504
13. U.S. Appln. No. 09/565,240, BPAI Appeal No. 2003-1135
14. U.S. Appln. No. 09/540,215, BPAI Appeal No. 2003-0996
15. U.S. Appln. No. 09/552,087, BPAI Appeal No. 2004-1772
16. U.S. Appln. No. 09/206,040, BPAI Appeal No. 2002-0078

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte STEFAN A. BLEDIG, JOSEPH R. BYRUM, and
JINGDONG LIU

Appeal 2008-4080
Application 10/959,789
Technology Center 1600

Decided: December 22, 2008

Before TONI R. SCHEINER, DONALD E. ADAMS, and ERIC GRIMES,
Administrative Patent Judges.

ADAMS, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims 1 and 14, the only
claims pending in this application. We have jurisdiction under 35 U.S.C.
§ 6(b).



STATEMENT OF THE CASE

The claims are directed to a substantially purified nucleic acid molecule. Claims 1 and 14 are reproduced below:

1. A substantially purified nucleic acid molecule that encodes a maize S-adenosylmethionine decarboxylase fragment wherein said nucleic acid molecule comprises the nucleic acid sequence of SEQ ID NO: 662.

14. A substantially purified nucleic acid molecule comprising the nucleic acid sequence of SEQ ID NO: 662.

The Examiner relies on the following prior art references to show unpatentability:

Lorraine A. Everett et al., *Pendred syndrome is caused by mutations in a putative sulphate transporter gene (PDS)*, 17 NATURE GENETICS 411-422 (1997).

Daryl A. Scott et al., *The Pendred syndrome gene encodes a chloride-iodide transport protein*, 21 NATURE GENETICS 440-443 (1999).

Sequence alignment between SEQ ID NO: 662 and gi 1532072 (*see* Ans. Appendix).

The rejections as presented by the Examiner are as follows:

Claims 1 and 14 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.

We reverse.

ISSUE

Did the Examiner meet his initial burden of challenging Appellants' presumptively correct assertion of utility?

FINDINGS OF FACT

1. Claim 14 is drawn to a substantially purified nucleic acid molecule comprising the nucleic acid sequence of SEQ ID NO: 662 (Claim 14). Claim 1 differs from claim 14 only in that the claimed substantially purified nucleic acid molecule encodes a maize S-adenosylmethionine decarboxylase fragment (Claim 1).
2. "Plants contain a pathway for the degradation of L-methionine. This degradation pathway includes . . . S-adenosyl-methionine decarboxylase (EC 4.1.1.50)" (Spec. 10: 11-14). Appellants' Specification discloses that "[t]he present invention . . . provides a substantially purified maize or soybean S-adenosylmethionine decarboxylase enzyme or fragment thereof encoded by a . . . nucleic acid sequence selected from the group consisting of a complement of SEQ ID NO: 430 through SEQ ID NO: 857" (Spec. 24: 7-9). Table A of Appellants' Specification discloses that SEQ ID NO: 662 is from Library SATMON008 (Spec. 254: Table A, SEQ ID NO: 662). "The SATMON008 cDNA library is generated from the primary shoot (coleoptile 2-3 cm) of maize . . . seedlings which are approximately 5 days old" (Spec. 166: 4-6). Appellants' Specification discloses that SEQ ID NO: 662 has 91% identity with adenosylmethionine decarboxylase (EC 4.1.1.50; NCBI gi 1532072) (Spec. 249: 30-40 and 254: 6).
3. Appellants' Specification discloses

In an aspect of the present invention, one or more of the nucleic molecules of the present invention are used to determine the level (i.e., the concentration of mRNA in a sample, etc.) in a plant (preferably maize or soybean) or pattern (i.e., the kinetics of expression, rate of decomposition, stability profile, etc) of the expression of a protein encoded in part or

whole by one or more of the nucleic acid molecule[s] of the present invention.

(Spec. 90: 3-7.) In addition, Appellants' Specification discloses that "[i]t is understood that one or more of the nucleic acids of the present invention may be introduced into a plant cell and transcribed using an appropriate promoter with transcription resulting in cosuppression of an endogenous Methionine pathway protein" (Spec. 121: 15-17). In this regard, Appellants' Specification discloses that "[a]ntisense approaches are a way of preventing or reducing gene function by targeting the genetic material" (Spec. 121: 18-19).

4. Based on sequence homology comparisons Everett determines that pendrin is a sulfate transporter (Everett 419: col. 2, ll. 32-34; Ans. 7). Scott, however, reports that they "were unable to detect evidence of [pendrin's] sulfate transport [activity]" (Scott 440: col. 1, ll. 15-16). Scott concludes that despite pendrin's 45% homology to "the human sulfate transporter 'downregulated in adenoma'"; "pendrin does not function as a sulfate transporter, as suggested by its close homology to other sulfate transporters, but instead functions as a sodium-independent transporter of chloride and iodide" (Scott 441: col. 1, ll. 33-36; Ans. 7).

PRINCIPLES OF LAW

The "utility requirement" originates with the provision of 35 U.S.C. § 101 that a patent may be obtained on "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." An inquiry by the PTO into whether a claimed

invention satisfies the utility requirement typically has two distinct prongs. First, the PTO must determine whether the patent applicant has asserted a specific and substantial utility for the claimed invention. *In re Fisher*, 421 F.3d 1365, 1371 (Fed. Cir. 2005). Second, the PTO must ascertain whether there is any evidence that one of ordinary skill in the art would reasonably doubt the invention's asserted utility. *In re Brana*, 51 F.3d 1560, 1566 (Fed. Cir. 1995).

[T]he PTO has the initial burden of challenging a presumptively correct assertion of utility in the disclosure. . . . Only after the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence sufficient to convince such a person of the invention's asserted utility. *See In re Bundy*, 642 F.2d 430, 433, 209 USPQ 48, 51 (CCPA 1981).

Brana, 51 F.3d at 1566.

ANALYSIS

The Examiner finds that "[t]he claimed nucleic acid is not supported by a specific asserted utility because none of the disclosed uses of the nucleic acid in the specification is specific" (Ans. 4). We disagree.

Appellants' Specification discloses that SEQ ID NO: 662 has 91% identity with adenosylmethionine decarboxylase (EC 4.1.1.50) and that this enzyme is involved in the degradation of L-methionine (FF 2). Appellants' Specification further discloses that the inventive nucleic acid molecules can be used, inter alia, to determine the concentration of mRNA in a sample, to determine the expression pattern of a protein encoded in part or whole by one or more of the nucleic acid molecules, and to inhibit expression using

antisense approaches (FF 3). There is no evidence on this record that Appellants' claimed nucleic acid molecule would not be useful in determining the mRNA concentration of adenosylmethionine decarboxylase, expression pattern of adenosylmethionine decarboxylase in a sample, or in antisense approaches to prevent or reduce the function of the adenosylmethionine decarboxylase gene. In addition, there is no evidence on this record that a full length sequence or that further research would be required to perform these utilities. Accordingly, we disagree with the Examiner's assertion that "the application does not show that the claimed polynucleotide is useful to the public as disclosed in its current form" (Ans. 5).

The Examiner finds that a person of ordinary skill in this art would "have reasonable doubt that the nucleotide sequence of SEQ ID NO: 662" encodes S-adenosyl methionine decarboxylase (Ans. 6). In this regard, the Examiner finds that "it is only in a small region of gi 1532072 . . . that the best local similarity between the two sequences is 91%" (*id.*). Further, with reference to Everett and Scott the Examiner finds that "[i]n the instant case, the numerous mismatches and the relatively low identity between the two sequences would leave reasonable doubt to one skilled in the art that the sequence of SEQ ID NO:662 would encode[] an S-adenosyl methionine decarboxylase activity" (Ans. 7). We are not persuaded.

Claim 14 does not require the claimed nucleic acid molecule to encode an S-adenosyl methionine decarboxylase activity (FF 1). In addition, claim 1 requires only that the claimed substantially purified nucleic acid molecule encode a maize S-adenosylmethionine decarboxylase *fragment* (*id.*). There is no evidence on this record that SEQ ID NO: 662 does not

encode a S-adenosylmethionine decarboxylase fragment. Further, as discussed above, there is no evidence on this record to suggest that the claimed nucleic acid would not be capable of performing the disclosed utilities (FF 3). Accordingly, we are not persuaded by the Examiner's assertion that

without showing the active domain or functional motif for the enzyme S-adenosyl-methionine decarboxylase, if any, is conserved in the sequence of SEQ ID NO:662 and the near 15% difference between the two sequences would not destroy the function of S-adenosyl-methionine decarboxylase, one skilled in the art would have reasonable doubt that SEQ ID NO:662 encodes S-adenosyl-methionine decarboxylase.

(Ans. 11-12). There is no requirement in Appellants' claimed invention that the nucleic acid molecule encode a functional S-adenosyl-methionine decarboxylase protein.

Lastly, we agree with Appellants' contention that Everett and Scott appear to suggest that homology of less than 50% may not provide an accurate functional assignment. However, . . . SEQ ID NO: 662 has at worst an 85.9% identity with a known S-adenosyl-methionine decarboxylase. There is no support for the Examiner's proposition that the claimed invention does not have specific and substantial utility based on the Examiner's citation of Everett *et al.* and Scott *et al.*

(App. Br. 8.)

CONCLUSION OF LAW

For the foregoing reasons we find that the Examiner has failed to meet his burden of challenging Appellants' presumptively correct assertion of utility. *Brana*, 51 F.3d at 1566.

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Accordingly, the rejection of claims 1 and 14 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility is reversed.

REVERSED

cdc

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UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte
MICHAEL D. EDGERTON, PAUL S. CHOMET, and
LUCILLE B. LACCETTI

Appeal 2008-1662
Application 10/310,154
Technology Center 1600

Decided: December 8, 2008

Before, DEMETRA J. MILLS, ERIC GRIMES, and RICHARD M.
LEBOVITZ, *Administrative Patent Judges*.

MILLS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134. The Examiner has rejected the claims for lack of written description, lack of enablement, anticipation and obviousness. We have jurisdiction under 35 U.S.C. § 6(b).

STATEMENT OF THE CASE

The following claims are on appeal.

29. A transgenic plant having recombinant DNA expressing a deoxyhypusine synthase.
30. A transgenic plant of claim 29 wherein said plant is selected from the group consisting of cotton, wheat, soybean, maize, rice and canola.
31. A transgenic plant of claim 29 wherein said recombinant DNA expressing a deoxyhypusine synthase comprising a polynucleotide selected from the group consisting of:
- (a) a polynucleotide comprising a nucleic acid sequence of SEQ ID NO:92;
 - (b) a polynucleotide encoding a polypeptide having an amino acid sequence of SEQ ID NO:460;
 - (c) a polynucleotide having at least 60% sequence identity to a polynucleotide comprising a nucleic acid sequence of SEQ ID NO:92;
 - (d) a polynucleotide encoding a polypeptide having at least 70% sequence identity to a polypeptide having an amino acid sequence of SEQ ID NO:460;
 - (e) a polynucleotide comprising a promoter functional in a plant cell operably joined to a coding sequence for a polypeptide having at least 70% sequence identity to a polypeptide having an amino acid sequence of SEQ ID NO:460; wherein the encoded polypeptide is a functional homolog of said polypeptide having an amino acid sequence of SEQ ID NO:460.

Cited References

Goodman et al.	US 4,956,282	Sep. 11, 1990
Lalgudi et al.	US 2001/0051335 A1	Dec. 13, 2001

Dietrich Ober et al., *Deoxyhypusine Synthase from Tobacco*, 274 J. OF BIOLOGICAL CHEMISTRY 32040-32047 (1999).

Grounds of Rejection

1. Claims 29-31 stand rejected under 35 U.S.C. § 112, first paragraph for lack of written description.

2. Claims 29-31 are rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement.

3. Claims 29-30 are rejected 35 U.S.C. § 102(e) as anticipated by Lalgudi.

4. Claims 29-31 are rejected 35 U.S.C. § 103(a) as obvious over Ober in view of Goodman.

Written Description

1. Claims 29-31 stand rejected under 35 U.S.C. § 112, first paragraph for lack of written description. We select claims 29 and 31 as representative of the rejection before us since Appellants have not separately argued claim 30. 37 C.F.R. § 41.37(c)(1)(vii).

ISSUE

The Examiner contends that the claims do not meet the written description requirement because “[t]he claims encompass mutants and allelic variants of sequences encoding deoxyhypusine synthase and thus imply that structural variants exist in nature, yet no structural variant has been disclosed.” (Ans. 3.) “The claims also encompass deoxyhypusine synthases from other species.” (*Id.*)

The implication is that there is a gene and a protein other than that disclosed which exists in nature, but the structure thereof is not known. The enzyme from a single *Zea mays* clone is not representative of said enzyme obtained from other *Zea mays* clones, other plants or organisms.

(*Id.* at 3-4.)

Appellants contend that the

Section 112 rejection is inappropriate in view of the fact that the Office has not provided any evidence that a person skilled in the art in the year 2002 would expect any significant degree of unpredictability in performance of deoxyhypusine synthase proteins (other than those enumerated) expressed from recombinant DNA in a transgenic plant.

(App. Br. 6.) Appellants submit “that a chemical name ‘deoxyhypusine synthase’ even without the disclosure of the nucleotide and amino acid sequence of three species would have been adequate for meeting the written description requirement for claims 29 and 30.” (*Id.* at 7-8.)

Therefore, the issue is whether the genus of DNAs expressing deoxyhypusine synthase of claim 29 lacks written description. In addition, issue is whether the genus of DNAs expressing deoxyhypusine synthase of polypeptides having 60% and 70% sequence identity with SEQ NO:92 in claim 31 lacks written description. In the alternative the issue is whether SEQ ID NO:92 is representative of the genus claimed. (Ans. 3.)

FINDINGS OF FACT

1. The claims encompass mutants and allelic variants of sequences encoding deoxyhypusine synthase. (Ans. 3.)
2. Claim 29 is not limited to particular species or source from which the claimed deoxyhypusine synthase is obtained. (*Id.*)
3. Specification, Table 1, page 27, discloses “SEQ ID NO:84 comprising 1764 nucleotides of DNA sequence encoding a yeast deoxyhypusine synthase of 387 amino acids of SEQ ID NO:452.” (App. Br. 5; *See also* Sequence listing.)

4. Specification, Table 1, page 28, discloses SEQ ID NO:91 comprising 1409 nucleotides of DNA sequence encoding a soybean deoxyhypusine synthase of 368 amino acids of SEQ ID NO:459 and the corresponding sequence is recited in the Sequence listing.
5. Specification, Table 1, page 28, discloses SEQ ID NO:92 comprising 1505 nucleotides of DNA sequence encoding a corn deoxyhypusine synthase of 370 amino acids of SEQ ID NO:460. (*Id.*; *See also* Sequence listing.)
6. The invention comprises polypeptides which differ in one or more amino acids from those of a protein sequence provided in the Specification as the result of one or more conservative amino acid substitutions, deletions or insertions, but having the same function as the polypeptide provided in the Specification. (Spec. 10:13-17.)
7. The Specification does not contain a sequence which varies the amino acids of SEQ ID NO:92.
8. Claim 31 is dependent upon claim 29, which is broader in scope than claim 31.

PRINCIPLES OF LAW

The Examiner

“bears the initial burden ... of presenting a prima facie case of unpatentability.” ... Insofar as the written description requirement is concerned, that burden is discharged by “presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims.”

In re Alton, 76 F.3d 1168, 1175 (Fed. Cir. 1996). Adequate written description means the written description must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the

inventor] was in possession of the [claimed] *invention*.” *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). “The descriptive text needed to meet the [written description requirement] . . . varies with the nature and scope of the invention at issue, and with the scientific and technologic knowledge already in existence.” *Capon v. Eshhar*, 418 F.3d 1349, 1357 (Fed. Cir. 2005).

“A written description of an invention involving a chemical genus, like a description of a chemical species, ‘requires a precise definition, such as by structure, formula, [or] chemical name,’ of the claimed subject matter sufficient to distinguish it from other materials.” *University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 1568 (Fed. Cir. 1997) (bracketed material in original). The claims in *Lilly* were directed generically to vertebrate or mammalian insulin cDNAs. *See id.* at 1567. The court held that a structural description of a rat cDNA was not an adequate description of these broader classes of cDNAs.

The *Lilly* court explained that

a generic statement such as . . . ‘mammalian insulin cDNA,’ without more, is not an adequate written description of the genus because it does not distinguish the claimed genus from others, except by function. It does not specifically define any of the genes that fall within its definition. It does not define any structural features commonly possessed by members of the genus that distinguish them from others. One skilled in the art therefore cannot, as one can do with a fully described genus, visualize or recognize the identity of the members of the genus.

Id. at 1568. Finally, the *Lilly* court set out exemplary ways in which a genus of cDNAs could be described:

A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by

nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to the members of the genus, which features constitute a substantial portion of the genus.

Id. at 1569.

Our appellate reviewing court revisited the issue of describing DNA. *See Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956 (Fed. Cir. 2002). The *Enzo* court held that a claimed DNA could be described without, necessarily, disclosing its structure. The Court adopted the standard that

the written description requirement can be met by “show[ing] that an invention is complete by disclosure of sufficiently detailed, relevant identifying characteristics . . . *i.e.*, complete or partial structure, other physical and/or chemical properties, *functional characteristics when coupled with a known or disclosed correlation between function and structure*, or some combination of such characteristics.”

See id. at 964 (ellipsis and bracketed material in original).

Our appellate review court has also noted that “*Eli Lilly* did not hold that all functional descriptions of genetic material necessarily fail as a matter of law to meet the written description requirement; rather, the requirement may be satisfied if in the knowledge of the art the disclosed function is sufficiently correlated to a particular, known structure.” *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1332 (Fed. Cir. 2003).

ANALYSIS

The Examiner argues with respect to claims 29 and 31 that there are insufficient relevant identifying characteristics to allow one skilled in the art to predictably determine the structure of deoxyhypusine

synthases from other sources based upon Appellant's disclosure, absent further guidance. (Ans. 4.) The Examiner finds that "there is lack of adequate description to inform a skilled artisan that Appellant was in possession of the claimed invention at the time of filing." (*Id.*)

We find no error in the Examiner's prima facie case of lack of written description. First, we interpret claims 29 and 31 as directed to a functional deoxyhypusine synthase. The Specification does not describe structural features of the deoxyhypusine synthase protein which are characteristic of all deoxyhypusine synthase proteins. Furthermore, the Specification does not describe structural features which are required for the protein to have functional activity.

In particular, with respect to claim 29, a definition by function alone "does not suffice" to sufficiently describe a coding sequence "because it is only an indication of what the gene does, rather than what it is." *Eli Lilly*, 119 F.3d at 1568.

The Examiner particularly finds with respect to claim 31 that the "enzyme from a single *Zea mays* clone is not representative of said enzyme obtained from other *Zea mays* clones, other plants or organisms." (Ans. 3-4.) "For example, one skilled in the art would not be able to reliably predict the structure of a sorghum deoxyhypusine synthase based upon the disclosure of SEQ ID NO:92." (*Id.* at 4.) "There are insufficient relevant identifying characteristics to allow one skilled in the art to predictably determine the structure of deoxyhypusine synthases from other sources based upon Appellant's disclosure, absent further guidance." (*Id.*) We agree with the Examiner's analysis and the finding that the Specification does not adequately describe the genus of claim 31.

Appellants argue that the

Section 112 rejection is inappropriate in view of the fact that the Office has not provided any evidence that a person skilled in the art in the year 2002 would expect any significant degree of unpredictability in performance of deoxyhypusine synthase proteins (other than those enumerated) expressed from recombinant DNA in a transgenic plant.

(App. Br. 6.)

The Examiner responds to Appellants, arguing that the “Office does not question whether the claimed deoxyhypusine synthases would have enzymatic function (an enablement issue), but rather it is unpredictable to determine the structure of all deoxyhypusine synthases claimed based upon the disclosure of three sequences.” (Ans. 8.) The Examiner is correct that unpredictability is associated with the issue of enablement, and that Appellants have not established with adequate evidence that the three SEQ ID's disclosed (FF 3, 4, 5) are representative of the claimed genus of polynucleotides recited in claim 29 coding for proteins with deoxyhypusine synthase activity. (Ans. 8.) In other words, Appellants have not provided any evidence of a correlation between the disclosed structures of deoxyhypusine synthase and its corresponding functional activity.

Furthermore, with respect to claim 31, Appellants have not provided evidence that those of ordinary skill in the art could predict which amino acids can vary from SEQ ID NO: 92 without losing the deoxyhypusine synthase activity. Consequently, there is no information about which nucleotides can be varied in SEQ ID NO: 92 encoding a deoxyhypusine synthase, within the claimed genus of polynucleotides having 60% identity

with SEQ ID NO: 92 and while still retaining deoxyhypusine synthase activity.

Thus, a polynucleotide having the nucleic acid sequence of SEQ ID NO:92 is not representative of the genus of polynucleotides having at least 60% sequence identity to SEQ ID NO:92 which can vary, for example up to 40% from those of SEQ ID NO:92, as in claim 31. When an applicant attempts to show written description support via the “representative number of species” approach, the applicant must provide a “sufficient number” of representative species to show possession of the breadth of the genus, “as opposed to merely one or two such species” within the genus. *Enzo*, 323 F.3d at 967 (citing *Lilly*, 119 F.3d at 1568). What constitutes a “sufficient number” will “vary depending on the nature of the invention claimed.” *Id.* at 963 (citing *In re DiLeone*, 436 F.2d 1404, 1405 (CCPA 1971). In other words, “to satisfy the written description requirement for a claimed genus, a specification must describe the claimed invention in such a way that a person of skill in the art would understand that the genus that is being claimed has been invented, not just a species of the genus.” *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.*, 541 F. 3d 1115, 1124 (Fed. Cir. 2008).

Appellants have sequenced three nucleic acid sequences falling within the scope of claim 29, i.e., yeast, soybean, and corn (FF3-5). However, Appellants have not shown any sequence of deletion, insertion, or substitution mutants which would be encompassed by the claims (FF6). Thus, Appellants have not provided an adequate written description of the scope of the genus under the “representative number of species” test, *see Carnegie Mellon University*, 541 F.3d at 1126 (“One must show that one has

possession, as described in the application, of sufficient species to show that he or she invented and disclosed the totality of the genus.”); *cf. In re Gostelli*, 872 F.2d 1008, 1012 (Fed. Cir. 1989) (determining that the disclosure of two chemical compounds within a subgenus did not describe that subgenus). This, Appellants have not done.

We do not find that the written description conveys with reasonable clarity to those skilled in the art that the inventor was in possession of the invention of claims 29 and 31.

CONCLUSION OF LAW AND DECISION

In view of the above, we conclude that Appellants have failed to rebut the Examiner's *prima facie* case of lack of written description and that the Specification does not contain a written description of the genus of claims 29 and 31. The rejection is affirmed.

2. Enablement

Claims 29-31 are rejected under 35 U.S.C. § 112, first paragraph, because the specification, while being enabling for SEQ ID NO:92 and a nucleic acid sequence encoding SEQ ID NO:460, does not reasonably provide enablement for the genus of DNAs encoding deoxyhypusine synthases and nucleic acid sequences having 60% sequence identity to SEQ ID NO:92 or 70% sequence identity to SEQ ID NO:460. (Ans. 4-5.) We select claims 29 and 31 as representative of the rejection before us since Appellants have not separately argued claim 30. 37 C.F.R. 41.37(c)(1)(vii).

ISSUE

The Examiner finds:

First of all, it is understood by the Office that the scope of claim 31 is not broader than claim 29, since it depends from claim 29. Thus, claim 29 would also encompass deoxyhypusine synthases having less than 60% sequence identity to SEQ ID NO:92 and less than 70% sequence identity to SEQ ID NO:460. Secondly, the generic recitation of "deoxyhypusine synthase" in claim 29 is not enabled because if the structures of all claimed deoxyhypusine synthases are not disclosed or known, as is the case here, then one skilled in the art cannot make and use the claimed invention without undue experimentation. Thirdly, the breadth of the 60-70% sequence identity language encompasses sequences having unspecified deletions, additions, substitutions and combinations thereof while maintaining deoxyhypusine synthase activity. Neither the state of the prior art nor Appellant has provided guidance as to which regions of SEQ ID NOs:92 or a sequence encoding SEQ ID NO:460 must be retained for activity, and which regions can tolerate mutations. Appellant provided no working examples of sequences having 60-70% sequence identity. While one skilled in the art can readily make mutations to SEQ ID NOs:92 or a sequence encoding SEQ ID NO:460, further guidance is required as to which mutations would be tolerated.

(Ans. 5.) The Examiner concludes that "[a]bsent of such guidance, one skilled in the art cannot make and use the claimed invention as commensurate in scope with the claims without undue experimentation" (*id.*)

Appellants contend that

identifying and isolating DNA encoding deoxyhypusine synthase, cloning the coding DNA into a transformation vector, transforming tissue and regenerating a plant is not a simple task, but it is achievable to a determined person of ordinary skill in the art willing to dedicate the time and resources to accomplishing the task. It is simply routine experimentation.

(App. Br. 10.) Appellants further argue that “[i]n view of the general high level of skill common to practitioners of the art of plant transformation the specification is an adequate template for such enablement for a person of ordinary skill in the art.” (*Id.*) “Such a person, if motivated to clone DNA for expressing a deoxyhypusine synthase is more than capable of cloning such DNA from any number of distinct organisms and performing plant transformation using the methods disclosed in the specification.” (*Id.*)

Therefore, the issue presented is whether one skilled in the art can make and use the claimed invention without undue experimentation, particularly whether Appellants have provided guidance as to which regions of SEQ ID NOs:92 or a sequence encoding SEQ ID NO:460 must be retained for activity, and which regions can tolerate mutations.

FINDINGS OF FACT

See findings of fact 1-8 herein.

9. Appellants provided no working examples of sequences having 60-70% identity with SEQ ID NO:92. (Ans. 5.)

10. The Specification does not provide guidance as to which regions of SEQ ID NOs:92 or a sequence encoding SEQ ID NO:460 must be retained for activity, and which regions can tolerate mutations.

11. The nature of the invention is the enzyme deoxyhypusine synthase, which transfers an aminobutyl moiety from spermidine to eukaryotic initiation factor 5A (eIF5A) (Spec. 58: 28 to 59: 2).

PRINCIPLES OF LAW

Whether the disclosure is enabling is a legal conclusion based on several underlying factual inquiries. *See In re Wands*, 858 F.2d 731, 735-37 (Fed. Cir. 1988). As set forth in *Wands*, the factors to be considered in determining whether a claimed invention is enabled throughout its scope without undue experimentation include the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claims.

“When rejecting a claim under the enablement requirement of section 112, the PTO bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by that claim is not adequately enabled by the description of the invention provided in the specification of the application.” *In re Wright*, 999 F.2d 1557, 1561-62 (Fed. Cir. 1993).

“[T]o be enabling, the specification . . . must teach those skilled in the art how to make and use *the full scope of the claimed invention* without ‘undue experimentation.’” *Wright*, 999 F.2d at 1561 (emphasis added), *quoted in Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997). Thus, “there must be sufficient disclosure, either through illustrative examples or terminology, to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed.” *In re Vaeck*, 947 F.2d 488, 496 & n. 23 (Fed. Cir. 1991), *quoted in Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1374 (Fed. Cir. 1999).

ANALYSIS

We agree with the Examiner's findings with respect to the *Wands* factors (FF 9-11; Ans. 4-5) and conclude that sufficient evidence has been presented to support a prima facie case of lack of enablement throughout the claim scope.

Once the Examiner has established a reasonable basis to question the enablement provided for the claimed invention, the burden falls on the Appellant to present persuasive arguments, supported by suitable proofs where necessary, that one skilled in the art would be able to make and use the claimed invention using the disclosure as a guide. *See In re Brandstadter*, 484 F.2d 1395, 1406 (CCPA 1973).

Appellants argue that it would have been routine experimentation to isolate the genes encoding deoxyhypusine synthase from other species. (App. Br. 10.) However, the claims are not limited to naturally occurring sequences of deoxyhypusine synthase. Claim 31 reads on all functional mutants that are 70% identical to SEQ ID NO: 460 or encoded by DNA at least 60% identical to SEQ ID NO: 92. Claims 29 and 30 read on transgenic plants expressing a functional deoxyhypusine synthase with any amino acid sequence.

Appellants have failed to present any evidence or proof that one of ordinary skill in the art would have been able to make and use the claimed invention throughout its scope using the disclosure as a guide, or that it would have been a matter of routine experimentation to make functional mutant deoxyhypusine synthases having 60% identity with SEQ ID NO: 460 70% identity with SEQ ID NO:92, as in claim 31. As claim 31 is dependent

upon independent claim 29 which is broader in scope than claim 31, claim 29 lacks enablement for the same reasons that claim 31 lacks enablement.

CONCLUSION OF LAW

In view of the above, we conclude that one skilled in the art reading the present Specification would not have been able to make and use the claimed invention without undue experimentation, as Appellants have failed to provide guidance or enable which regions of SEQ ID NOs:92 or a sequence encoding SEQ ID NO:460 must be retained for activity, and which regions can tolerate mutations. The enablement rejection is affirmed.

Anticipation

3. Claims 29-30 are rejected 35 U.S.C. § 102(e) as anticipated by Lalgudi.

ISSUE

The Examiner contends that a prima facie case of anticipation has been established, and Lalgudi describes a deoxyhypusine synthase.

Appellants contend that Lalgudi does not anticipate the pending claims because Lalgudi does not describe a functional deoxyhypusine synthase, as claimed. (App. Br. 12.)

Does Lalgudi describe a functional deoxyhypusine synthase, as claimed?

FINDINGS OF FACT (FF)

12. Claim 29, as we interpret it in view of the Specification, requires that the deoxyhypusine synthase have deoxyhypusine synthase activity. (Spec. 28 and 58-64; App. Br. 12.)

13. Lalgudi lists in Table 1, a DNA clone 700353442H1 isolated from corn and identified as “DYS1; Dys1p; Deoxyhypusine synthase” (Lalgudi, p. 110; App. Br. 11.)
14. Lalgudi's sequence listing for the 700353442H1 clone on page 110, SEQ ID NO: 4214, includes 285 nucleotides. (App. Br. 11-12.)

PRINCIPLES OF LAW AND ANALYSIS

In order for a prior art reference to anticipate a claimed invention, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim. *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

Appellants contend that the “sequence reported by Lalgudi as being annotated with the function of deoxyhypusine synthase is but 285 nucleotides in length and lacks an indication of reading frame.” (App. Br. 12.) They compare the length of the Lalgudi fragment with the length of sequences of DNA for encoding deoxyhypusine synthase that are disclosed in Appellant's Sequence Listing: “SEQ ID NO:84 comprising 1764 nucleotides of DNA sequence encoding a yeast deoxyhypusine synthase of 387 amino acids, . . . SEQ ID NO:91 comprising 1409 nucleotides of DNA for encoding a soybean deoxyhypusine synthase of 368 amino acids, and . . . SEQ ID NO:92 comprising 1505 nucleotides of DNA for encoding a corn deoxyhypusine synthase of 370 amino acids” (*id.*), i.e., with coding sequences of more than 1000 nucleotides in each case.

Appellants further argue that

Lalgudi may disclose a variety of plants including a plant with an expression vector containing a promoter regulatory element which regulates the expression of at least one DNA,

e.g. typically fractional parts of protein coding sequence such as the 285 nucleotide-long fractional coding sequence of a deoxyhypusine synthase of SEQ ID NO:4214, but Lalgudi does not disclose or suggest a sequence of a functional deoxyhypusine synthase.

(App. Br. 12.)

Appellants claim a transgenic plant including "DNA expressing a deoxyhypusine synthase" (claim 29); i.e., DNA encoding a protein having deoxyhypusine synthase activity. The Examiner has not provided adequate evidence that the SEQ ID NO: 4214 fragment of Lalgudi encodes a functional deoxyhypusine synthase. On the other hand, Appellants provide evidence that the sequence disclosed is Lalgudi is only a fraction of the full-length functional sequences for deoxyhypusine synthase disclosed in their Specification.

CONCLUSION OF LAW

We conclude that the Examiner's has failed to provide sufficient evidence to support a *prima facie* case of anticipation as the DNA disclosed by Lalgudi does not reasonably appear to encode a functional deoxyhypusine synthase. The rejection is reversed.

Obviousness

4. Claims 29-31 are rejected 35 U.S.C. § 103(a) as obvious over Ober in view of Goodman.

ISSUE

The Examiner concludes,

it would have been *prima facie* obvious to one skilled in the art at the time the invention was made to utilize the transgenic

plant of Goodman to express the deoxyhypusine synthase of Ober for the purpose of obtaining physiologically active deoxyhypusine synthase or simply as an alternative expression host to the *E. coli* expression system of Ober. One skilled in the art would have been motivated to do so with a reasonable expectation of success.

(Ans. 6-7.)

Appellants contend that there is no motivation to combine the cited references. (App. Br. 13.)

The issue is whether the Examiner has articulated a credible reason, suggestion or motivation to combine the cited references.

FINDINGS OF FACT

15. Ober teaches expression of tobacco deoxyhypusine synthase in *E. coli* (title). "Deoxyhypusine synthase catalyzes the formation of a deoxyhypusine residue in the translation eukaryotic initiation factor 5A (eIF5A) precursor protein by transferring an aminobutyl moiety from spermidine onto a conserved lysine residue within the eIF5A polypeptide chain" (Ober, Abstract). "A mechanistically identical reaction is known in the biosynthetic pathway leading to pyrrolizidine alkaloids in plants" (*id.*).

16. "The tobacco deoxyhypusine synthase of Ober has 74% sequence identity to Appellant's SEQ ID NO:460 (Fig. 1, also see attached sequence alignment data from UnitProt 03 database)." (Ans. 6.)

17. "Ober does not teach expression of deoxyhypusine synthase using a plant expressing system." (*Id.*)

18. Goodman teaches the expression of heterologous proteins such as enzymes using transgenic plants (col. 2, l. 29).

19. "Goodman states that proteins which are obtained from the unicellular microorganisms may not have been properly processed or folded so as to realize a substantial proportion or all of the physiological activity of the naturally occurring peptide obtained from a native host (col. 1, lns. 33-38)."

(Ans. 6.)

20. Goodman does not teach expression of a deoxyhydrosine synthase in a plant cell.

21. As to a reason to combine the cited references the Examiner concludes, it would have been *prima facie* obvious to one skilled in the art at the time the invention was made to utilize the transgenic plant of Goodman to express the deoxyhypusine synthase of Ober for the purpose of obtaining physiologically active deoxyhypusine synthase or simply as an alternative expression host to the *E. coli* expression system of Ober. One skilled in the art would have been motivated to do so with a reasonable expectation of success.

(Ans. 6-7.)

PRINCIPLES OF LAW AND ANALYSIS

In making an obviousness determination over a combination of prior art references, it is important to identify a reason why persons of ordinary skill in the art would have attempted to make the claimed subject matter. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). When making such a determination, the scope of the prior art and level of ordinary skill must be considered. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

Appellants argue:

Ober *et al.* disclose the expression of tobacco deoxyhypusine synthase in *E. coli*. There is no teaching or suggestion by Ober *et al.* of a transgenic plant with recombinant

DNA for expressing a deoxyhypusine synthase. Goodman *et al.* does not supplement the deficiency of Ober *et al.* in failing to teach or suggest a transgenic plant with recombinant DNA for expressing deoxyhypusine synthase. Rather Goodman *et al.* discloses the expression of mammalian proteins in plant cells for the purpose of harvesting and isolating such mammalian proteins. Appellant has not found, nor has the Examiner pointed out, any objective evidence in Goodman *et al.* that would motivate a person of ordinary skill in the art to look to Ober *et al.* for suggestions of genes to express in plants. Appellant has not found, nor has the Examiner pointed out, any objective evidence in Ober *et al.* that would motivate a person of ordinary skill in the art to look to Goodman *et al.* for suggestions for transferring the DNA for expressing deoxyhypusine synthase from yeast to a plant.

(App. Br. 13.)

We agree with Appellants and conclude that the Examiner has not presented sufficient evidence to support a *prima facie* case of obviousness. In particular, we do not find that the Examiner has provided a sufficient reason to combine the cited references or to express deoxyhypusine synthase in a plant cell. Ober, page 32046, col. 2, states that the function of deoxyhypusine synthase in plants is unknown, but speculates that it is involved with plant metabolism. (FF11.) In our view, without an indication of a known function for deoxyhypusine synthase, one of ordinary skill in the art would have no apparent reason to express deoxyhypusine synthase in plant cells, and thus there would have been no reason for one of ordinary skill in the art to combine the disclosures of Ober and Goodman.

CONCLUSION OF LAW

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In view of the above, the obviousness rejection over Ober in view of Goodman is reversed.

SUMMARY

The written description and enablement rejections are affirmed. The anticipation and obviousness rejections are reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

cdc

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UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte MOLIAN DENG and ROBIN L. STAUB

Appeal 2008-5017
Application 09/920,953
Technology Center 1600

Decided: December 9, 2008

Before ERIC GRIMES, RICHARD M. LEOVITZ, and MELANIE L.
McCOLLUM, *Administrative Patent Judges*.

McCOLLUM, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a nucleic acid molecule and a transformed cell. The Examiner has rejected the claims as lacking utility and being nonenabled. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

Claims 1-4 and 6-15 are pending and on appeal. The claims have not been argued separately and therefore stand or fall together. 37 C.F.R. § 41.37(c)(1)(vii). We will focus on claim 1, which reads as follows:

1. An isolated nucleic acid molecule comprising a nucleotide sequence of SEQ ID NO: 2 or complement thereof.

Claims 1-4 and 6-15 stand rejected under 35 U.S.C. § 101 for lacking patentable utility (Ans. 3). The Examiner finds that the “instant application does not disclose a specific, substantial, and credible utility for SEQ ID NO: 2 or for any polypeptide that is encoded by SEQ ID NO: 2” (*id.*). In particular, the Examiner finds that “Table 1 shows that SEQ ID NO: 2 encodes a polypeptide that is 81% identical to the 60S ribosomal protein L10 of *Solanum melongena*,” but that “a patentable utility is not readily apparent to one of skill in the art based upon the disclosure in the instant application and what was known in the art as of the effective filing date of the instant claims” (*id.* at 3-4).

Claims 1-4 and 6-15 also stand rejected under 35 U.S.C. § 112, first paragraph, “as failing to comply with the enablement requirement” (*id.* at 4). The Examiner finds that, “[s]ince the claimed invention lacks utility under 35 U.S.C. § 101, the instant application does not teach how to use the invention” (*id.*).

Appellants contend that the “specification provides a specific, substantial, and well-established utility for . . . the nucleic acid sequence of SEQ ID NO: 2 . . . and transformed cells comprising SEQ ID NO: 2” (App. Br. 4). In particular, Appellants contend that they

have provided a statistically significant correlation between the nucleic acid sequence of SEQ ID NO: 2 and a known protein. The utility of the known protein is well-established and the correlation between the known protein and SEQ ID NO: 2 is specific. In setting forth a reasonable correlation between the known protein and the claimed nucleic acid sequence of SEQ ID NO: 2, Appellants have demonstrated that the claimed invention has patentable utility.

(*Id.*)

ISSUE

Did the Examiner err in finding that the Specification does not disclose a specific and substantial utility for the claimed nucleic acid molecules?

FINDINGS OF FACT

1. The Specification discloses “nucleic acid sequences from the unicellular green algae, *Chlorella sarokiniana*” (Spec. 1).
2. In particular, the Specification discloses 9395 nucleic acid sequences from *Chlorella sarokiniana* cDNA libraries (*id.* at 1-3).
3. Specification “Table 1 sets forth a list of nucleic acid molecules that encode *Chlorella sarokiniana* proteins or fragments thereof which are homologues of known proteins” (*id.* at 9).
4. Specification Table 1 refers to a clone identified as LIB3602-006-Q1-K1-B6 (*id.* at 69).
5. Specification Table 1 indicates that, using BLASTX, Clone LIB3602-006-Q1-K1-B6 encodes a polypeptide having 81% identity with at least a portion of the 60S Ribosomal Protein L10 of *Solanum melongena* (*id.* at 69 and 261).

6. Clone LIB3602-006-Q1-K1-B6 is indicated to have the sequence identified as SEQ ID NO: 2 in the Sequence Listing¹ (*id.*).

7. Specification Table 1 also indicates that the nucleic acids represented by SEQ ID NOs 1 to 41 each encodes a polypeptide having at least 50% identity with at least a portion of the 60S Ribosomal Protein L10 of *Solanum melongena* (*id.* at 69-71).

ANALYSIS

Section 101 requires a utility that is both substantial and specific. A substantial utility requires “show[ing] that an invention is useful to the public as disclosed in its current form, not that it may prove useful at some future date after further research. Simply put, to satisfy the ‘substantial’ utility requirement, an asserted use must show that that claimed invention has a significant and presently available benefit to the public.” *In re Fisher*, 421 F.3d 1365, 1371 (Fed. Cir. 2005). A specific utility is “a use which is not so vague as to be meaningless.” *Id.* In other words, “in addition to providing a ‘substantial’ utility, an asserted use must also show that [the] claimed invention can be used to provide a well-defined and particular benefit to the public.” *Id.*

Appellants argue that the “specification clearly discloses that SEQ ID NO: 2 can be used to encode a 60S Ribosomal Protein L10 or fragment

¹ According to the Sequence Listing, SEQ ID NO: 2 relates to Clone ID: LIB3602-001-P1-K6-A10, not LIB3602-006-Q1-K1-B6. Thus, it is not clear whether the sequence identification numbering in Table 1 is consistent with the numbering in the Sequence Listing. However, for the purpose of this appeal, we are assuming that the SEQ ID NO: 2 recited in the claims refers to the sequence of Clone LIB3602-006-Q1-K1-B6 identified as having SEQ ID NO: 2 in Table 1.

thereof” (App. Br. 4). Based on the Specification, Appellants argue that “one of ordinary skill in the art would readily recognize that the claimed nucleic acid molecules and cells have utility, for example, to encode a 60S Ribosomal Protein L10” (*id.* at 4-5).

We are not persuaded. The Specification discloses that SEQ ID NO: 2 encodes a polypeptide having 81% identity with a 60S Ribosomal Protein L10 or a fragment thereof (Findings of Fact (FF) 5-6). However, even assuming that SEQ ID NO: 2 could be used to encode a 60S Ribosomal Protein L10 or fragment thereof, Appellants have not shown why encoding this protein or fragment provides “a significant and presently available benefit to the public.”

Appellants also argue that “the specification provides for the use of the nucleic acid molecules . . . in identifying polymorphisms related to 60S Ribosomal Protein L10”; “in transforming plants to modify the expression of 60S Ribosomal Protein L10”; and “in determining the level or pattern of expression of the 60S Ribosomal Protein L10 or mRNA associated with that 60S Ribosomal Protein L10 nucleic acid molecule, for example in a cell” (App. Br. 7).

We are not persuaded. With regard to identifying polymorphisms, Appellants have not presented any evidence showing that the claimed EST has been used to identify a single polymorphism and have “not shown that a polymorphism . . . so identified would have a ‘specific and substantial’ use.” *Fisher*, 421 F.3d at 1373. Thus, we agree that this use merely represents a hypothetical possibility. In addition, even assuming that SEQ ID NO: 2 encodes a 60S Ribosomal Protein L10 or fragment thereof, Appellants have

not shown that there is “a significant and presently available benefit to the public” in transforming plants to modify the expression of this polypeptide or in determining the level or pattern of expression of this polypeptide or its corresponding mRNA.

In addition, Appellants argue that “the utility of SEQ ID NO: 2 is *well-established* because 60S Ribosomal Protein L10 is a well-known, established protein” (App. Br. 7). The Examiner agrees that “60S Ribosomal Protein L10s have been known in microorganism for at least thirty years” (Ans. 7). However, we agree with the Examiner that the fact that a protein family is known is insufficient by itself to show that proteins of this family, and therefore nucleic acids encoding proteins of this family, provide “a significant and presently available benefit to the public.”

CONCLUSION

Appellants have not shown that the Examiner erred in finding that the Specification does not disclose a specific and substantial utility for the claimed nucleic acid molecules. We therefore affirm the rejections of claims 1-4 and 6-15 under 35 U.S.C. § 101 and § 112, first paragraph.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PHILIP W. MILLER and MING PENG

Appeal 2008-2258
Application 09/692,257
Technology Center 1600

Decided: September 18, 2008

Before TONI R. SCHEINER, DONALD E. ADAMS, and ERIC GRIMES,
Administrative Patent Judges.

ADAMS, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims 1 and 8-13, the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

INTRODUCTION

The claims are directed to a substantially purified nucleic acid molecule. Claim 8 is illustrative:

8. A substantially purified nucleic acid molecule comprising a nucleic acid sequence of SEQ ID NO: 1 or its complement.

The Examiner does not rely on prior art to support the rejections of record.

The rejections as presented by the Examiner are as follows:

Claims 1 and 8-13 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.

We affirm.

PROCEDURAL HISTORY

This is the second appeal of the subject matter of this Application. Appellants withdrew their first appeal (Appeal No. 2006-0705) by filing a Request for Continued Examination under 37 C.F.R. § 1.114 on March 29, 2006.

DISCUSSION

Claims 1 and 8-13 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112,

first paragraph based on the finding of lack of utility.¹ The claims have not been argued separately and therefore stand or fall together. 37 C.F.R. § 41.37(c)(1)(vii). Therefore, we limit our discussion to representative claim 8.

According to the Examiner, “[t]he claimed invention is not supported by a specific utility because the disclosed uses of the polynucleotide are not specific and are generally applicable to any polynucleotide” (Ans. 3). Appellants disagree, asserting instead that the claimed nucleic acid molecule is useful “to identify the presence or absence of a polymorphism associated with, for example, cold-response genes, and use as a marker of cold tolerance. *Specification* at page 34, line 21 to page 35, line 8” (App. Br. 5-6). According to Appellants “these utilities are not applicable to all polynucleotides in general because the claimed polynucleotides are obtained from cold-treated young maize seedlings. *See, for example, Specification* at page 88 (Example 1). Therefore, they have utilities that are specific to them, utilities that are not shared by polynucleotides in general” (App. Br. 6). We are not persuaded.

Claim 8 is drawn to a substantially purified nucleic acid molecule comprising a nucleic acid sequence of SEQ ID NO: 1 or its complement. According to Appellants’ Sequence Listing, SEQ ID NO: 1 is from the

¹ The Examiner rejected the claims under both 35 U.S.C. § 101 and 35 U.S.C. § 112, first paragraph. However the rejection for nonenablement was presented simply as a corollary of the finding of lack of utility (*see* Ans. 4 and 8). In addition, Appellants rely on their arguments to the rejection under 35 U.S.C. § 101 to rebut the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph. Therefore, although we discuss only the § 101 rejection, our conclusion also applies to the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph.

cDNA library LIB3136 (*see* Sequence Listing² 1: 17). According to Appellants' Specification the LIB3136 cDNA library "is prepared from young maize seedlings which have been subjected to cold treatment" (Spec. 88). We recognize that Appellants' Specification discloses subtractive cDNA libraries (*see e.g.*, Appellants' Example 3-6, Spec. 89-96), wherein cDNA from non-cold treated young maize seedlings is used to remove those nucleic acid molecules from the cold treated libraries that are common to both the cold treated and non-cold treated libraries. LIB3136, however, is not a subtractive library. As a result it remains unclear if the nucleic acid having SEQ ID NO: 1 is present only in cold treated libraries, or is instead present in both a cold treated library and a non-cold treated library. Accordingly, Appellants' assertion that the nucleic acid molecule having the sequence of SEQ ID NO: 1 has a specific utility because it is obtained from cold-treated young maize seedlings is not persuasive. Appellants do not identify, and we do not find, a disclosure in Appellants' Specification to support an assertion that SEQ ID NO: 1 is only present in cold-treated young maize seedling libraries.

Accordingly we are not persuaded by Appellants' assertion that a person of ordinary skill in this art would recognize that "SEQ ID NO: 1 can be used as a marker of cold tolerance" (App. Br. 7). For the foregoing reasons, this assertion lacks an evidentiary basis on this record.

As to the other disclosed utilities, e.g., "identifying promoters involved in gene regulation, determining whether a plant contains a mutation, and acting as molecular tags to isolate genetic regions, isolate genes, map genes, and determine gene function" (App. Br. 4-5), we find no

² Received by Technology Center 1600/2900 on July 12, 2002.

error in the Examiner's finding that these "uses of the polynucleotide are not specific and are generally applicable to any polynucleotide" (Ans. 3). Here, as in *In re Fisher*, 421 F.3d 1365, 1374 (Fed. Cir. 2005) nothing about Appellants' alleged uses set a nucleic acid molecule comprising a nucleic acid sequence of SEQ ID NO: 1 or its complement apart from the other 14,881³ ESTs disclosed in Appellants' Specification or from any EST derived from any organism. Accordingly, we conclude, as did the court in *Fisher*, that Appellants have only disclosed general uses for their claimed nucleic acid molecule, not specific ones that satisfy § 101. *Cf. id.*

As the Examiner explains, "the enablement rejection is based on the fact that no patentable utility has been set forth for the claimed invention and thus, one would not know how to use the claimed invention based on the disclosure of the specification" (Ans. 8). We find no error in the Examiner's rationale. Accordingly, we are not persuaded by Appellants' assertion that since they have disclosed "the complete chemical structure of SEQ ID NO: 1, one of ordinary skill in the art would understand how to use the sequence of SEQ ID NO: 1 for the uses disclosed in the specification, *e.g.*, identifying promoters and associated regulatory sequences . . . , and identifying polymorphisms" (App. Br. 11).

³ According to Appellants' Specification "[a]gents of the present invention include nucleic acid molecules and more specifically EST nucleic acid molecules or nucleic acid fragment molecules thereof" (Spec. 16). In addition, Appellants' Specification discloses that "[t]he present invention also provides one or more substantially purified nucleic acid molecules comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 14882 or complements thereof" (Spec. 10).

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For the reasons set forth above, we affirm the rejection of claim 8 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility. Claims 1 and 9-13 fall together with claim 8.

CONCLUSION

In summary, we affirm the rejections of record.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

cdc

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NORDINE CHEIKH, DANE K. FISHER, and JINGDONG LIU

Appeal 2008-2045
Application 09/237,183
Technology Center 1600

Decided: September 26, 2008

Before TONI R. SCHEINER, DONALD E. ADAMS, and ERIC GRIMES,
Administrative Patent Judges.

ADAMS, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims 2 and 7-27, the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

INTRODUCTION

The claims are directed to a substantially purified nucleic acid molecule. Claims 2 and 7 are illustrative:

2. A substantially purified nucleic acid molecule that encodes a maize or a soybean enzyme, wherein said nucleic acid molecule comprises a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 11, 446, 935, 1108, 2042, 2166, 2252, 2644, 2681, and 2753, wherein said enzyme encoded by said nucleic acid molecule is triose phosphate isomerase, vacuolar H⁺ translocating-pyrophosphatase, sucrose synthase, hexokinase, fructose 1,6-bisphosphate aldolase, fructose 6-phosphate 2-kinase, invertase, fructokinase, NDP-kinase, and UDP-glucose pyrophosphorylase, respectively.

7. A substantially purified nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 11, 446, 935, 1108, 2042, 2166, 2252, 2644, 2681, and 2753.

The Examiner relies on the following evidence to support the rejections of record.¹

Russell et al., *Structural Features can be Unconserved in Proteins with Similar Folds*, 244 *J. Mol. Biol.* 332-350 (1994).

Gerhold et al., *It's the genes! EST access to human genome content*, 18(12) *BioEssays* 973-981 (1996).

Wells et al., *The chemokine information source: identification and characterization of novel chemokines using the WorldWideWeb and*

¹ The Examiner incorrectly asserts that "[n]o evidence is relied upon by the examiner in the rejection of the claims under appeal" (Ans. 3). The Examiner relies on a number of evidentiary references to support her position (Ans. 9). Appellants' arguments addressed these references (App. Br. 8). Accordingly, we find the Examiner's misstatement of the evidence to be a harmless error on this record.

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Expressed Sequence Tag Databases, 61(5) *J. Leukocyte Biol.* 545-550 (1997).

Attwood, *The babel of bioinformatics*, 290 *Science* 471-473 (2000).

The rejections as presented by the Examiner are as follows:

Claims 2 and 7-27 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.

We reverse.

DISCUSSION

Claims 2 and 7-27 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.²

The claims are drawn to a substantially purified nucleic acid molecule that encodes a maize or a soybean enzyme. Independent claims 2 and 7 require that the nucleic acid molecule comprises a nucleic acid sequence selected from the group consisting of:

a. SEQ ID NO: 11, which encodes for a maize or soybean triose phosphate isomerase enzyme or fragment thereof (Spec. 26);

² The Examiner rejected the claims under both 35 U.S.C. § 101 and 35 U.S.C. § 112, first paragraph. However the rejection for nonenablement was presented simply as a corollary of the finding of lack of utility (*see* Ans. 5). In addition, Appellants rely on their arguments to the rejection under 35 U.S.C. § 101 to rebut the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph. Therefore, although we discuss only the § 101 rejection, our conclusion also applies to the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph.

- b. SEQ ID NO: 446, which encodes for a maize or soybean vacuolar H^+ translocating-pyrophosphatase enzyme or fragment thereof (Spec. 28);
- c. SEQ ID NO: 935, which encodes for a maize or soybean sucrose synthase enzyme or fragment thereof (Spec. 29);
- d. SEQ ID NO: 1108, which encodes for a maize or soybean hexokinase enzyme or fragment thereof (Spec. 30);
- e. SEQ ID NO: 2042, which encodes for a maize or soybean fructose 1,6-biphosphate aldolase enzyme or fragment thereof (Spec. 26);
- f. SEQ ID NO: 2166, which encodes for a maize or soybean fructose 6-phosphate 2-kinase enzyme or fragment thereof (Spec. 27);
- g. SEQ ID NO: 2252, which encodes for a maize or soybean invertase enzyme or fragment thereof (Spec. 29);
- h. SEQ ID NO: 2644, which encodes for a maize or soybean fructokinase enzyme or fragment thereof (Spec. 30);
- i. SEQ ID NO: 2681, which encodes for a maize or soybean NDP-kinase enzyme or fragment thereof (*id.*); and
- j. SEQ ID NO: 2753, which encodes for a maize or soybean UDP-glucose pyrophosphorylase enzyme or fragment thereof (Spec. 32).

Claims 18-27 depend from claim 2. Claims 8-17 depend from claim 7.

As Appellants explain, their Specification discloses that the recited sequences can be used, *inter alia*, “to determine the level or pattern of expression of proteins or mRNAs associated with one of these coding sequences . . . and to overexpress or suppress one or more of these coding sequences in a transgenic plant” (App. Br. 6). According to Appellants, the asserted utilities are specific to the particular nucleic acid sequences listed in

their claims because they are “not shared by any general nucleic acid sequence” (*id.*). In addition, Appellants assert that the utilities are “*substantial* because the Specification as filed provides well-defined and particular benefits, for each of the[] sequences” and “are *well-established* because the proteins encoded by these sequences are well-known” (*id.*).

The Examiner is not persuaded. While Appellants assert that their “specification provides a statistically relevant correlation between the claimed nucleic acid sequences and the respective enzymes” (App. Br. 7), the Examiner asserts that Appellants’ reliance on “BLAST search alignment identity scores” is insufficient to establish that the claimed nucleic acid molecules have the recited enzymatic activity (Ans. 10). According to the Examiner, “one skilled in the art would have reason to doubt that sequence similarity alone would reasonably support the assertion that the biological activity of the claimed subject matter would be the same as that of the similar sequence” (Ans. 8). In support of this assertion, the Examiner relies on Atwood, Gerhold, Wells, and Russell (Ans. 8-9).

The Examiner does not, however, direct our attention to any portion of the cited references that support her position. Our review of the cited references leads us away from the Examiner’s conclusion. For example, Wells teaches that the chemokines family of proteins has been divided into the CXC, CC, and C subfamilies “depending on the spacings of highly characteristic cysteine residues within their amino-terminal regions” (Wells, 545: col. 2, ll. 20-22). Wells teaches that

In addition to the conserved cysteine motif described above, the CC chemokines share other clear sequence similarities such as a C-terminal helix and conserved hydrophobic sequences in the first and third beta sheet. These features make the identification

of novel chemokines in sequence databases relatively easy because even though the overall sequence identity levels between chemokines may be as low as 20%, the cysteine spacings and hydrophobicity may still be used to detect novel chemokine sequences.

(Wells, 545: col. 2, l. 28 - 546: col. 1, l. 6.) Therefore, Wells teaches that despite an overall sequence identity level as low as 20%, the features of the sequences may still be used to detect novel chemokine sequences.³ Further, the Gerhold paper discusses ESTs and teaches that “one can best find proteins related to *ras*, for example, using a protein or DNA sequence query” (Gerhold 975: col. 2, ll. 17-19).

Accordingly, we find that the evidence relied upon by the Examiner fails to support the Examiner’s assertion that “one skilled in the art would have reason to doubt that sequence similarity alone would reasonably support the assertion that the biological activity of the claimed subject matter would be the same as that of the similar sequence” (Ans. 8). Instead, we agree with Appellants’ assertion that “[n]one of the scientific publications set forth by the Examiner undermine the credibility of Appellants’ assertion that the utilities of SEQ ID NOs: 11, 446, 935, 1108, 2042, 2166, 2252, 2644, 2681, and 2753 are specific, substantial, or well-established” (App. Br. 8). Simply stated, the evidence on this record is not sufficient to rebut

³ In contrast to Wells’ observation that sequences with an identity level as low as 20% can be used to identify other chemokine sequences, the Examiner recognizes that the sequences of the claimed nucleic acid molecules are 79-80% identical to a sequence that encodes a specific enzyme as disclosed in Appellants’ Specification (Ans. 7; *see also* Spec. 26-32).

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Appellants' presumptively accurate disclosure. *In re Marzocchi*, 439 F.2d 220, 224 (CCPA 1971).

Accordingly, we reverse the rejection of claims 2 and 7-27 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.

CONCLUSION

In summary, we reverse the rejections of record.

REVERSED

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOSEPH R. BYRUM and THOMAS J. LA ROSA

Appeal 2008-1235¹
Application 09/199,129
Technology Center 1600

Decided: September 22, 2008

Before TONI R. SCHEINER, DONALD E. ADAMS, and
ERIC GRIMES, *Administrative Patent Judges*.

ADAMS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims 4-12, the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

¹ Appellants waived their request for Oral hearing (*see* Paper received September 3, 2008).

INTRODUCTION

The claims are directed to a transformed plant (claims 4-7) and a method for determining the level or pattern of protein expression in a plant cell or tissue (claims 8-12). Claims 4 and 8-10 are illustrative:

4. A transformed plant having a nucleic acid molecule which comprises:

(a) an exogenous promoter region which functions in a plant cell to cause the production of an mRNA molecule;

(b) a structural nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 and complement thereof; and

(c) a 3' non-translated sequence that functions in said plant cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of said mRNA molecule.

8. A method for determining a level or pattern in a plant cell or plant tissue of a protein in a plant comprising:

(a) incubating, under conditions permitting nucleic acid hybridization, a marker nucleic acid molecule, said marker nucleic acid molecule selected from the group of marker nucleic acid molecules which specifically hybridize to a nucleic acid molecule having the nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 or complement thereof, with a complementary nucleic acid molecule obtained from said plant cell or plant tissue, wherein nucleic acid hybridization between said marker nucleic acid molecule and said complementary nucleic

acid molecule obtained from said plant cell or plant tissue permits the detection of an mRNA for said protein;

(b) permitting hybridization between said marker nucleic acid molecule and said complementary nucleic acid molecule obtained from said plant cell or plant tissue; and

(c) detecting the level or pattern of said complementary nucleic acid, wherein the detection of said complementary nucleic acid is predictive of the level or pattern of said protein.

9. The method of claim 8, wherein said level or pattern is detected by *in situ* hybridization.

10. The method of claim 8, wherein said level or pattern is detected by tissue printing.

The Examiner does not rely on prior art to support the rejections of record.

The rejections as presented by the Examiner are as follows:

Claims 4-12 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.

We affirm.

PROCEDURAL HISTORY

This is the second appeal of the subject matter of this Application. Appellants withdrew their first appeal (Appeal No. 2003-2151) by filing a Request for Continued Examination under 37 C.F.R. § 1.114 on January 26, 2005.

CLAIM INTERPRETATION

Claim 4:

Claim 4 is drawn to a transformed plant having a nucleic acid molecule. The nucleic acid molecule of claim 4 comprises the following three parts:

1. an exogenous promoter region that functions in a plant cell to cause the production of an mRNA molecule;
2. a structural nucleic acid molecule; and
3. a 3' non-translated sequence that functions in the plant cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of the mRNA molecule.

According to claim 4, the structural nucleic acid molecule comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 and a complement thereof.

According to Appellants' Specification, "[a]gents of the present invention include nucleic acid molecules and more specifically EST nucleic acid molecules" (Spec. 19: 12-13). SEQ ID NO: 1 is one of 5,521 sequences disclosed in Appellants' Specification (*see, e.g.*, Spec. 11:14-16). The 5,521 nucleic acid molecules, including SEQ ID NO: 1, were isolated from a

cDNA library designated SOYMON001 which was prepared from the leaves of V4 stage plants of the soybean cultivar Asgrow 3244 (Spec. 85: 9-11).

Claim 8:

Claim 8 is drawn to a method for determining a level or pattern of protein expression in a plant cell or plant tissue. The claimed method comprises the following three steps:

- (a) incubating² a marker nucleic acid molecule³ with a complementary nucleic acid molecule obtained from a plant cell or tissue;
- (b) permitting hybridization between the marker nucleic acid molecule and the complementary nucleic acid molecule; and
- (c) detecting the level or pattern of the complementary nucleic acid.

According to claim 8, nucleic acid hybridization between the marker nucleic acid molecule and the complementary nucleic acid molecule permits the detection of an mRNA for the protein, which is predictive of the level or pattern of the protein expressed by the mRNA.

² Claim 8 requires that the incubation step be performed under conditions that permit nucleic acid hybridization.

³ Claim 8 requires that the marker nucleic acid molecule is selected from the group of marker nucleic acid molecules which specifically hybridize to a nucleic acid molecule having the nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 or complement thereof.

DISCUSSION

Claims 4-12 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.⁴ According to the Examiner

[T]here is no disclosed phenotype associated with the claimed transformed plant comprising SEQ ID NO: 1 or complement thereof, nor is there . . . any specific protein described wherein SEQ ID NO: 1 or its complement can be used to determine the level or pattern of expression of said protein in a plant.

(Ans. 5-6.) In addition, the Examiner finds that Appellants' Specification fails to "disclose a utility specific for a nucleic acid comprising SEQ ID NO: 1 or a specific utility or activity for a protein or fragment encoded by a nucleic acid encoding SEQ ID NO: 1 . . . [or] any full length gene which could be isolated using SEQ ID NO: 1" (Ans.⁵ 5). At best, the Examiner finds that the utilities disclosed in Appellants' Specification are generic and "generally applicable to any nucleic acid and/or protein" (Ans. 6).

In response, Appellants assert that "the claimed transgenic plants and methods provide clear and immediate benefits, for example, use to follow a

⁴ The Examiner rejected the claims under both 35 U.S.C. § 101 and 35 U.S.C. § 112, first paragraph. However the rejection for non-enablement was presented simply as a corollary of the finding of lack of utility (*see* Ans. 9). In addition, Appellants rely on their arguments to the rejection under 35 U.S.C. § 101 to rebut the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph. Therefore, although we discuss only the § 101 rejection, our conclusion also applies to the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph.

⁵ All references to the Examiner's Answer (Ans.) refer to the Supplemental Examiner's Answer mailed July 24, 2007.

plant through a breeding program . . . , and to determine the level or pattern of expression of a protein or mRNA associated with that nucleic acid molecule” (App. Br.⁶ 8). Appellants also assert that the claimed methods are useful in detecting the nucleic acid sequence of SEQ ID NO: 1 (App. Br. 11).

Appellants provide separate arguments for the following groups of claims: (I) claims 4-7; (II) claims 8, 11, and 12; (III) claim 9; and (IV) claim 10. Accordingly, we limit our discussion to claims 4 and 8-10. 37 C.F.R. § 41.37(c)(1)(vii).

Claim 4:

While Appellants’ Specification discloses the sequence for the EST having SEQ ID NO: 1, Appellants do not identify and we do not find any further characterization of this nucleic acid molecule. For example, it is unclear what, if any, protein would be encoded by the full length transcript corresponding to this EST. Appellants assert, however, that “transformed plants having, *inter alia*, a structural nucleic acid molecule comprising a nucleic acid sequence of SEQ ID NO: 1 or complement thereof, have utility independent of whether a function is known for the nucleic acid sequence” (App. Br. 9).

Specifically, Appellants assert that their Specification discloses the use of the nucleic acid sequence as a marker (App. Br. 9, *citing* Spec. 48:22 - 49:5). According to Appellants’ Specification, “soybean ESTs” can be used “in marker-assisted breeding programs” (Spec. 18:18-19). In this

⁶ All references to Appellants’ Brief (App. Br.) refer to the Supplemental Appeal Brief received April 13, 2007.

regard, Appellants assert that their Specification discloses the use of the claimed transgenic plants “in breeding programs to produce plants having genes of interest. *See, e.g.*, Specification at page 18, lines 18-19”⁷ (App. Br. 9). According to Appellants, the use of “the claimed transformed plants in a breeding program allows the breeder to readily track the transformed plant through the program by identifying progeny plants containing the nucleic acid molecule” (App. Br. 10). We are not persuaded.

As the Examiner points out, while the nucleic acid of SEQ ID NO: 1 may be used as a marker in a breeding program, such a use is neither specific nor substantial because such a use is generic in each of the “5522 [sic] nucleic acid molecules, fragments thereof, and complements thereof, as disclosed in the specification as filed” (Ans. 13). We agree. Here, as in *In re Fisher*, 421 F.3d 1365, 1374 (Fed. Cir. 2005), the asserted uses are not “specific.” Any EST transcribed from any gene in the soybean genome has the potential to perform any one of the alleged uses. Nothing about Appellants’ alleged uses set SEQ ID NO: 1, or a plant transformed with a construct comprising SEQ ID NO: 1, apart from the other 5,520 ESTs disclosed in Appellants’ Specification or from any EST derived from any organism. Accordingly, we conclude, as did the court in *Fisher*, that Appellants have only disclosed general uses for their claimed transformed plant, not specific ones that satisfy § 101. *Cf. id.*

We are also not persuaded by Appellants’ assertion that the claimed plants “provide a particularly appropriate and demonstrably useful starting

⁷ We recognize that Appellants also direct attention to “page 56, line 15 through page 75, line 10,” which discloses the methodology utilized in transforming plants (App. Br. 9).

point for example, to screen for compounds with herbicidal activity” (App. Br. 12). Appellants do not disclose a relationship between SEQ ID NO: 1 and herbicidal activity. Accordingly, we are not persuaded by Appellants’ unsupported conjecture.

For the foregoing reasons, we affirm the rejection of claim 4 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph, based on the finding of lack of utility. Claims 5-7 fall together with claim 4.

Claim 8:

According to Appellants “[u]ses for the claimed methods include detecting the presence or absence or level of expression of the sequence in a sample” (App. Br. 10). This information, however, is meaningless as Appellants have failed to identify any function for the EST having SEQ ID NO: 1. Stated differently, because the claimed EST has no disclosed function, knowing whether a nucleic acid molecule capable of hybridizing to this EST is present, absent, or expressed at a particular level in a plant fails to convey any useful information to a person of ordinary skill in the art. Accordingly, we disagree with Appellants’ assertion that “[t]he claimed methods using the nucleic acid molecules are particularly useful, for example, to detect the level in a plant cell or tissue of an mRNA corresponding to SEQ ID NO: 1” (App. Br. 11).

We are also not persuaded by Appellants’ assertion that SEQ ID NO: 1 can be used “to detect target genes for producing herbicide tolerant plants” (*id.*). As discussed above, there is no disclosed relationship between SEQ

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ID NO: 1, or any of the other 5,520 ESTs disclosed in Appellants' Specification, and herbicidal activity.

For all of the foregoing reasons, we affirm the rejection of claim 8 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph, based on the finding of lack of utility. Claims 11 and 12 fall together with claim 8.

Claim 9:

Claim 9 depends from and further limits the method of claim 8 to require that the level or pattern of complementary nucleic acid obtained from a plant cell or tissue is detected by *in situ* hybridization.

According to Appellants "[i]n situ hybridization can be used in a number of uses, for example to determine the spatial population or the steady-state levels of RNA accumulation in a tissue . . . to localize specific RNA sequences in cells, which is useful for gene mapping, following chromosomes in hybrid lines or detecting chromosomes with translocations, transversions, or deletions" (App. Br. 12-13). We are not persuaded.

As discussed above, because the EST having SEQ ID NO: 1 has no disclosed function, knowing whether a nucleic acid molecule capable of hybridizing to this EST is present, absent, or expressed at a particular level in a plant fails to convey any useful information to a person of ordinary skill in the art. Further, there is no evidence on this record that SEQ ID NO: 1 would be useful in detecting chromosomes with translocations, transversions, or deletions. Lastly, Appellants disclose nothing with regard to the use of SEQ ID NO: 1 to map genes and follow chromosomes in hybrid lines that would set SEQ ID NO: 1 apart from the other 5,520 ESTs

disclosed by Appellants. Accordingly, we are not persuaded by Appellants' assertions with regard to the general uses of the claimed method.

For the foregoing reasons, we affirm the rejection of claim 9 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph, based on the finding of lack of utility.

Claim 10:

Claim 10 depends from and further limits the method of claim 8 to require that the level or pattern of complementary nucleic acid obtained from a plant cell or tissue is detected by tissue printing.

Appellants assert that "[t]issue printing provides a convenient method to simultaneously screen on a single membrane many tissue sections from different plants or different developmental stages" (App. Br. 14). According to Appellants "[t]he Specification discloses that tissue printing can be used for the histochemical localization of various plant enzymes and nucleic acids" (*id.*). While all of this may be true, Appellants have failed to disclose why tissue printing a nucleic acid that hybridizes to the EST having SEQ ID NO: 1 would be relevant to a person of ordinary skill in the art, when there is no disclosed function or activity for a nucleic acid that hybridizes to a nucleic acid having SEQ ID NO: 1.

Accordingly, for the reasons set forth above, we affirm the rejection of claim 10 under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph, based on the finding of lack of utility.

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CONCLUSION

In summary, we affirm the rejections of record.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

clj

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID K. KOVALIC and JINGDONG LIU

Appeal 2008-2230
Application 09/684,016
Technology Center 1600

Decided: September 24, 2008

Before TONI R. SCHEINER, DONALD E. ADAMS, and ERIC GRIMES,
Administrative Patent Judges.

ADAMS, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims 11-16, the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).



INTRODUCTION

The claims on appeal are directed to a substantially purified nucleic acid molecule. Claims 11, 13 and 14 are illustrative:

11. A substantially purified nucleic acid molecule comprising a fragment nucleic acid molecule having from about 30 to about 50 nucleotide residues of a nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411.

13. A substantially purified nucleic acid molecule comprising a fragment nucleic acid molecule having from about 30 to about 50 nucleotide residues, wherein said fragment nucleic acid molecule exhibits complete complementarity to a fragment of a second nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411 or a complete complement thereof.

14. A substantially purified nucleic acid molecule having between 90% and 100% sequence identity with nucleotides 1 through 123 of SEQ ID NO: 48411 or a complete complement thereof.

The Examiner relies on the following prior art reference to show unpatentability:¹

Mahairas et al., GenEMBL Acc. No. AQ451805.

¹ We find the Examiner's assertion that "[n]o evidence is relied upon by the Examiner in the rejection of the claims under appeal" to be in error. Nevertheless, because Appellants specifically addressed the reference relied upon by the Examiner, we find this error harmless (*see* App. Br. 20-21).

The rejections as presented by the Examiner are as follows²:

1. Claims 11-16 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph based on the finding of lack of utility.
2. Claims 11-15 stand rejected under the written description provision of 35 U.S.C. § 112, first paragraph.
3. Claim 13 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Mahairas.

We affirm the rejections under 35 U.S.C. § 101 and under the enablement provision of 35 U.S.C. § 112, first paragraph. We also affirm the rejection under 35 U.S.C. § 102(b). We reverse the rejection under the written description provision of 35 U.S.C. § 112, first paragraph.

DISCUSSION

Utility:

Claims 11-16 stand rejected under 35 U.S.C. § 101 as lacking a patentable utility and under the enablement provision of 35 U.S.C. § 112, first paragraph, based on the finding of lack of utility.³ The claims have not been argued separately and, therefore, stand or fall together.

² While the Examiner discusses a rejection of claim 14 under the written description provision of 35 U.S.C. § 112, first paragraph, as containing new matter (Ans. 7), the Examiner later expressly withdrew this rejection "upon reconsideration" (Ans. 22).

³ The Examiner rejected the claims under both 35 U.S.C. § 101 and 35 U.S.C. § 112, first paragraph. However, the rejection for nonenablement was presented simply as a corollary of the finding of lack of utility (*see* Ans.

37 C.F.R. § 41.37(c)(1)(vii). Therefore, we limit our discussion to representative claim 11.

Claim 11 is drawn to a substantially purified⁴ nucleic acid molecule. The nucleic acid molecule comprises a fragment of a nucleic acid molecule having from about 30 to about 50 nucleotide residues of a nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411.

Initially, we recognize that Appellants' Specification discloses "substantially purified nucleic acid molecule[s] where the nucleic acid molecule[s] comprise[] a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 463,173 or complements thereof or fragments of either" (Spec. 3:12-14). According to Appellants' Specification:

Agents of the present invention include plant nucleic acid molecules and more preferably include maize, soybean, cotton, sorghum, teosinte, wheat, and rice nucleic acid molecules.

4-5). Therefore, although we discuss only the § 101 rejection, our conclusion also applies to the rejection under the enablement provision of 35 U.S.C. § 112, first paragraph.

⁴ Appellants' Specification discloses that:

The term "substantially purified," as used herein, refers to a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

(Spec. 9:3-9.)

A subset of the nucleic acid molecules of the present invention includes nucleic acid molecules that are marker molecules. Another subset of the nucleic acid molecules of the present invention includes nucleic acid molecules that encode a protein or fragment thereof. Another subset of the nucleic acid molecules of the present invention is cDNA molecules.

(Spec. 8:22-27.) While claim 11 is drawn to a substantially purified nucleic acid molecule comprising a nucleic acid molecule having from about 30 to about 50 nucleotide residues of a nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411, Appellants fail to disclose which subset of nucleic acid molecules, if any, SEQ ID NO: 48411 is a member (*Cf. id.*). In this regard, we note that apart from a listing of its sequence, SEQ ID NO: 48411 remains uncharacterized.

Nevertheless, Appellants assert that the claimed nucleic acid can be used to identify the presence or absence of polymorphisms, to measure the level of mRNA in a sample, as molecular markers, to isolate nucleic acid homologues of other plants and organisms, to isolate or identify the promoter of the gene corresponding to that claimed nucleic acid molecule, and to perform high-throughput microarray analysis of expression changes in a series of tissue samples (App. Br. 7-10 and 12 (footnotes omitted)).

However, as the Examiner explains, "the Specification summarized pretty much the [state of the art in] modern biotechnology in general, but never connects . . . [SEQ ID NO: 48411] to any particular or specific utility. This wishlist-like [sic] desire for a utility for the claimed sequences seems to fall short of a readily available utility" (Ans. 3-4). We find no error in the Examiner's conclusion that Appellants have not satisfied the utility

requirement for the claimed nucleic, which - but for its sequence - remains uncharacterized.

Here, as in *In re Fisher*, 421 F.3d 1365, 1374 (Fed. Cir. 2005) nothing about Appellants' alleged uses set a nucleic acid molecule comprising a nucleic acid sequence of SEQ ID NO: 48411 or its complement apart from any of the other 463,172 sequences disclosed in Appellants' Specification. Accordingly, we conclude, as did the court in *Fisher*, that Appellants have only disclosed general uses for their claimed nucleic acid molecule, not specific ones that satisfy § 101. *Cf. id.*

For the foregoing reasons, we affirm the rejection of claim 11 under 35 U.S.C. § 101, and the enablement provision of 35 U.S.C. § 112, first paragraph. As they are not separately argued, claims 12-16 fall together with claim 11.

Written Description:

Claims 11-15 stand rejected under the written description provision of 35 U.S.C. § 112, first paragraph.

The rejection is based on the Examiner's concern that Appellants' use of the transitional term "comprising" results in claims drawn to a large genus of nucleic acid molecules which are not adequately described by Appellants' Specification. (Ans. 5-7). We disagree.

As Appellants explain, they have fully described the nucleotide sequence of SEQ ID NO: 48411 (App. Br. 17). We agree. All the claims before us on appeal are drawn to a nucleic acid molecule that has the nucleic acid sequence of SEQ ID NO: 48411 or a complete complement thereof, a fragment or complement of a fragment of the nucleic acid molecule defined

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by SEQ ID NO: 48411, or has between 90-100% or 99-100% sequence identity with nucleotides 1-123 of SEQ ID NO: 48411 or a complete complement thereof.

No doubt, the use of the transitional term “comprising⁵” opens the claims to read on a nucleic acid molecules that include more than SEQ ID NO:48411, or a fragment thereof, e.g., a fragment of SEQ ID NO: 48411 in an expression vector. However, all members of the genus will include a common structural feature that is described in Appellants’ Specification. Specifically, all members of the genus will include a fragment of a nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411 or a nucleic acid molecule, or fragment thereof, having some level of sequence identity with the nucleotide sequence of SEQ ID NO: 48411. One of ordinary skill in this art would recognize that Appellants were in possession of this common structural feature of all the members within the genus encompassed by the claims. *See e.g.*, Written Description Training Materials 13-14 (rev. 1 March 25, 2008) (<http://www.uspto.gov/web/menu/written.pdf>)).

Accordingly, we agree with Appellants that they have provided an adequate written description of nucleic acid molecules set forth in their claims. Therefore, we reverse the rejection of claims 11-16 under the written description provision of 35 U.S.C. § 112, first paragraph.

⁵ We note that the Examiner appears to have interpreted the term “having” as it appears in claims 14 and 15 to mean “comprising. *See, e.g., Lampi Corp. v. American Power Products Inc.*, 228 F.3d 1365, 1376, 56 USPQ2d 1445, 1453 (Fed. Cir. 2000) (The term “having” was interpreted as open terminology, allowing the inclusion of other components in addition to those recited).

Anticipation:

Claim 13 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Mahairas.

Claim 13 is drawn to a substantially purified nucleic acid molecule. The claimed nucleic acid molecule comprises a fragment of a nucleic acid molecule that:

1. has from about 30 to about 50 nucleotide residues and
2. exhibits complete complementarity to a fragment of a second nucleic acid molecule having the nucleotide sequence of SEQ ID NO: 48411 or a complete complement thereof.

According to Appellants' Specification, "molecules are said to be 'complementary' if they can hybridize to one another with sufficient stability to permit them to remain annealed to one another under conventional 'high-stringency' conditions" (Spec. 10: 6-8). Appellants' Specification discloses that "[a] nucleic acid molecule is said to be the 'complement' of another nucleic acid molecule if they exhibit complete complementarity" (Spec. 9: 30 - 10: 2). "As used herein, molecules are said to exhibit 'complete complementarity' when every nucleotide of one of the molecules is complementary to a nucleotide of the other" (Spec. 10: 2-4).

Therefore, while the claimed nucleic acid molecule may be of any length larger than about 30 nucleotides, claim 13 places two structural requirements on the claimed nucleotide sequence. Specifically, the claimed nucleic acid molecule must comprise (1) a fragment of a specific size (about 30 to about 50 nucleotides) and (2) a specific sequence (one wherein every nucleotide of the fragment of the claimed nucleic acid molecule is complementary to a fragment of a second nucleic acid molecule that has the

nucleotide sequence of SEQ ID NO: 48411 or a complete complement thereof).

Mahairas teaches a nucleic acid molecule that is 349 nucleotides in length (Mahairas). Appellants do not dispute, and therefore concede,⁶ that Mahairas' nucleic acid molecule comprises a 21 nucleotide fragment that exhibits complete complementarity to a 21 nucleotide fragment of a second nucleic acid molecule that has the nucleotide sequence of SEQ ID NO: 48411 or a complete complement thereof (*id.*; *see also* Ans. 8). Instead, Appellants assert that the fragment taught by Mahairas falls outside the scope of the about 30 to about 50 nucleotide residue size limitation set forth in claim 13 (App. Br. 21).

In essence, the issue present is whether the term "about 30" reads on a nucleotide fragment of 21 nucleotides in length. Notwithstanding, Appellants' assertion to the contrary, we find that the preponderance of the evidence on this record supports a conclusion that it does.

According to Appellants, "the term 'about' in the present claims should be given its 'plain and ordinary meaning'" (App. Br. 21 (*citing BJ Services Co. v. Haliburton Energy Services, Inc.*, 338 F.3d 1368, 1373 (Fed. Cir. 2003))). In this regard, Appellants assert that a "21 nucleotide base pair fragment fails to give 'about 30 nucleotides' its 'plain and ordinary meaning'" (*id.*). Appellants do not, however, direct our attention to any portion of their Specification, the prosecution history of this application, or extrinsic evidence to support this assertion.

⁶ Arguments not made are waived. *See* 37 C.F.R. § 41.37(c)(1)(vii) ("Any arguments or authorities not included in the brief or a reply brief . . . will be refused consideration by the Board, unless good cause is shown.").

“The use of the word ‘about,’ avoids a strict numerical boundary to the specified parameter.” *Ortho-McNeil Pharmaceutical, Inc. v. Caraco Pharmaceutical Laboratories, Ltd.*, 476 F.3d 1321, 1326 (Fed. Cir. 2007); see also *In re Harris*, 409 F.3d 1339, 1343 (Fed. Cir. 2005) (“[U]se of the term ‘about’ shows that the applicants did not intend to limit the claimed ranges to their exact end-points”); *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1217 (Fed. Cir. 2005) (“[T]he word ‘about’ does not have a universal meaning in patent claims[;]” rather, “the meaning depends on the technological facts of the particular case”); *Eiselstein v. Frank*, 52 F.3d 1035, 1039 (Fed. Cir. 1995) (“The meaning of the word ‘about’ is dependent on the facts of the case, the nature of the invention, and the knowledge imparted by the totality of the . . . disclosure to those skilled in the art.”).

Upon consideration of claim 13 in light of Appellants’ Specification, we find that a person of ordinary skill in this art would reasonably interpret the term “about” broadly as it relates to the fragment length of Appellants’ claimed nucleic acid molecule. In this regard, we note that Appellants’ Specification discloses nucleic acid molecule fragments of about 15 to about 250 nucleotide residues (Spec. 8: 29-30). In addition, Appellants’ Specification discloses two additional, yet overlapping fragment size ranges - about 15 to about 30 nucleotide residues and about 30 to about 50 nucleotide residues⁷ (Spec. 8: 30 - 9: 1).

Considering the two overlapping ranges, it is clear that Appellants have disclosed a lower (about 15) and an upper (about 50) limit. The issue

⁷ Appellants’ Specification also discloses a second set of overlapping ranges from about 30 to about 50 nucleotide residues and about 50 to about 100 nucleotide residues (Spec. 9: 1-2).

we are faced with, however, is how a person of ordinary skill in this art would interpret the intermediate fragment size of about 30 in view of Appellants' disclosure and the conventional knowledge in this art at the time the invention was made. Stated differently, how many additional nucleotides on either side of 30 are included by the term "about"?

The Examiner interprets the range "from about 30 to about 50" to include a fragment with nine fewer nucleotides, e.g., a 21 nucleotide fragment that exhibits complete complementary to a fragment of a second nucleic acid molecule that has the nucleotide sequence of SEQ ID NO: 48411 or a complete complement thereof as is taught by Mehaires.

For their part, Appellants fail to identify any disclosure in their Specification to suggest that 21 nucleotides does not fall within the scope of about 30 nucleotides. Similarly, Appellants offer no evidence to suggest that a person of ordinary skill in this art would not reasonably interpret the term about 30 as reading on a 21 nucleotide fragment. Instead, Appellants simply provide an unsupported assertion that "21 nucleotides fails to give 'about 30 nucleotides' its 'plain and ordinary meaning'" in this art (App. Br. 21). We are not persuaded by this unsupported assertion or Appellants' reliance on *BJ Services*. Claim 5 at issue in *BJ Services* was drawn to a method of fracturing a subterranean formation. One step in the claimed method required, *inter alia*, a hydratable polymer blend "wherein the hydratable polymer [had] . . . a C* value of about 0.06 percent by weight" (*BJ Services*, 338 F.3d at 1370).

BJ Services argue[d] that the term "about" is intended to encompass the range of experimental error that occurs in any measurement and that one of skill in the art would readily understand the range that "about 0.06" was intended to include.

To that end, it presented the experimental results obtained by its expert, all of which were slightly above or below 0.06 for an average of 0.0596.

(*Id.*, at 1372.) Halliburton “agreed that the jury should be instructed to give ‘about 0.06’ its plain and ordinary meaning” (*id.*, at 1373). Therefore, our appellate reviewing court concluded that “[g]iven that the term ‘about’ was used to encompass experimental error and that the jury had before it the typical experimental range, substantial evidence support[ed] the jury’s finding” (*id.*).

On this record, it is clear that the term “about” refers to the length of a nucleic acid molecule fragment. There is, however, no evidence on this record to support Appellants’ contention that a fragment of “about 30” nucleotides does not include 21 nucleotides.

It may be that Appellants intend the phrase “from about 30 to about 50” to mean from 30 or more to 50 or less. In this scenerio, a range from about 15 to about 30 would be interpreted as meaning from 15 or more to 30 or less. The problem, however, is that if this was Appellants’ intention, their claim, Specification, and arguments fail to articulate such an interpretation.

Accordingly, absent evidence to the contrary, we affirm the rejection of claim 13 under 35 U.S.C. § 102(b) as being anticipated by Mahairas.

CONCLUSION

In summary, we affirm the rejections under 35 U.S.C. § 101 and under the enablement provision of 35 U.S.C. § 112, first paragraph. We also

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Application 09/684,016

affirm the rejection under 35 U.S.C. § 102(b). We reverse the rejection under the written description provision of 35 U.S.C. § 112, first paragraph.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

clj

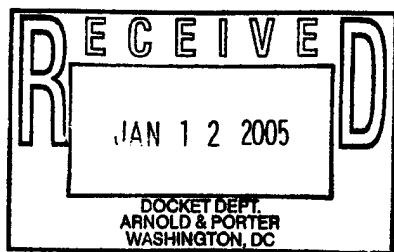
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The opinion support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

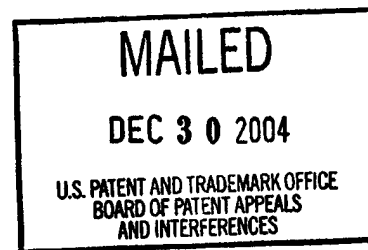
**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte JOSEPH R. BYRUM



Appeal No. 2004-1772
Application No. 09/552,087

ON BRIEF



Before WILLIAM F. SMITH, ADAMS, and GREEN, Administrative Patent Judges.

ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 3, 5-7, 9, 10, and 12-20, which are all the claims pending in the application.

Claims 3, 7 and 12 are illustrative of the subject matter on appeal and are reproduced below:

3. A transformed plant cell having a nucleic acid molecule which comprises:
 - (A) an exogenous promoter region which functions in said cell to cause the production of a mRNA molecule, wherein said promoter nucleic acid molecule comprises SEQ ID NO: 1 or a complement thereof; which is linked to
 - (B) a structural nucleic acid molecule encoding a protein or peptide; which is linked to

(C) a 3' non-translated sequence that functions in said cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of said mRNA molecule.

7. A transformed plant having a nucleic acid molecule which comprises:
 - (A) an exogenous promoter region which functions in a plant cell to cause the production of a mRNA molecule, wherein said promoter nucleic acid molecule comprises SEQ ID NO: 1, or a complement thereof; which is linked to
 - (B) a structural nucleic acid molecule encoding a protein or peptide; which is linked to
 - (C) a 3' non-translated sequence that functions in a plant cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of said mRNA molecule.
12. A substantially purified nucleic acid molecule, wherein said nucleic acid molecule comprises a nucleic acid sequence having between 100% and 70% identity with a nucleic acid sequence of SEQ ID NO: 1 or a complement thereof.

No prior art is relied upon in support of the examiner's position.

GROUND OF REJECTION

Claims 3, 5-7, 9-10 and 12-20 stand rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility.

Claims 12-19 stand rejected under 35 U.S.C. § 112, first paragraph, as the specification fails to provide an adequate written description of the claimed invention.

We reverse the written description rejection, and remand the application to the examiner for further consideration of the utility and enablement rejections.

DISCUSSION

Written Description:

The examiner rejected the claims as inadequately described, on the basis that the claimed nucleic acids

comprise SEQ ID NO: 1 or a nucleic acid related to SEQ ID NO: 1 by a particular range of identity (i.e. 100% to 80% identity, as in claim 13)¹. This genus is sufficiently broad so as to encompass a multitude of variants of SEQ ID NO:1, as well as any full length coding sequence, mRNA, promoter, or genomic DNA of which SEQ ID NO: 1 is a portion, or of which the recited polynucleotides with identity to SEQ ID NO: 1 are portions. This large genus is represented in the specification by one species, a nucleic acid consisting of SEQ ID NO: 1.

Answer, bridging paragraph, pages 8-9 .

We will reverse this rejection. The written description requirement of 35 U.S.C. § 112, first paragraph, does not require a description of the complete structure of every species within a chemical genus. See Utter v. Hiraga, 845 F.2d 993, 998, 6 USPQ2d 1709, 1714 (Fed. Cir. 1988) ("A specification may, within the meaning of 35 U.S.C. § 112, ¶ 1, contain a written description of a broadly claimed invention without describing all species that claim encompasses.").

The Federal Circuit has held that "[a] description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to the members of the genus, which

¹ While the examiner refers to claim 13, which depends from claim 12, we note as illustrated above, that claim 12 is broader than claim 13, in that it relates to a "sequence having between 100% and 70% identity with a nucleic acid sequence of SEQ ID NO: 1 or a complement thereof."

features constitute a substantial portion of the genus." University of California v. Eli Lilly and Co., 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997).

Our appellate reviewing court has also held that the complete structure of a claimed DNA is not necessarily required. The court adopted the standard that "the written description requirement can be met by 'show[ing] that an invention is complete by disclosure of sufficiently detailed, relevant identifying characteristics . . . i.e., complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics.'" Enzo Biochem, Inc. v. Gen-Probe Inc., 296 F.3d 1316, 1324, 63 USPQ2d 1609, 1613 (Fed. Cir. 2002) (emphasis omitted, alterations in original).

With respect to the claimed sequences that have 70% to 100% identity with SEQ ID NO:1, the Lilly court held that a genus could be described via "recitation of structural features common to the members of the genus, which features constitute a substantial portion of the genus." Lilly, 119 F.3d at 1568, 43 USPQ2d at 1406. The Enzo court held that such a description could take the form of "complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics." 296 F.3d at 1324, 63 USPQ2d at 1613. In this case, the complete structure of SEQ ID NO:1 has been described, and the nucleic acids of the claimed genus share 70 or more percent identity with the structure of SEQ ID NO:1. Thus, the structural features that are common to the genus make up 70% of the structure

of the claimed polypeptides. The examiner has not adequately explained why this degree of structural similarity is inadequate to "constitute a substantial portion of the genus," as required by Lilly.

Accordingly, we reverse the rejection of claims 12-19 under 35 U.S.C. § 112, first paragraph, as the specification fails to provide an adequate written description of the claimed invention.

Utility:

The issues of whether a disclosure satisfies the "how to use" provision of 35 U.S.C. § 112, and the utility requirement of 35 U.S.C. § 101, are closely related. See In re Swartz, 232 F.3d 862, 863, 56 USPQ2d 1703 (Fed. Cir. 2000), Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1358, 52 USPQ2d 1029, 1034 (Fed. Cir. 1999), Newman v. Quigg, 877 F.2d 1575, 1581, 11 USPQ2d 1340, 1345 (Fed. Cir. 1989). Under the utility requirement, our appellate reviewing court, has held that it makes no sense to require claims to set forth inventions that satisfy all the disclosed objectives, but that "[w]hen a properly claimed invention meets at least one stated objective, utility under § 101 is clearly shown." Raytheon Co. v. Roper Corp., 724 F.2d 951, 958, 220 USPQ 592, 598 (Fed. Cir. 1983).

As set forth in In re Langer, 503 F.2d 1380, 183 USPQ 288 (CCPA 1974), emphasis in original:

As a matter of Patent Office practice, a specification which contains a disclosure of utility which corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of Section 101 for the entire claimed subject matter unless there is reason for one skilled in the art to question

the objective truth of the statement of utility or its scope. Assuming that sufficient reason to question the statement of utility and its scope does exist, a rejection for lack of utility under Section 101 will be proper on that basis; such a rejection can be overcome by suitable proofs indicating that the statement of utility and its scope as found in the specification are true. Cf. In re Marzocchi, 58 CCPA 1069, 1073, 439 F.2d 220, 223, 169 USPQ 367, 369 (1971) (involving the enablement requirement of 35 U.S.C. 112, first paragraph).

According to the examiner (Answer, page 6), "[t]here has been no specific assertion that in fact SEQ ID NO: 1 is a promoter, aside from the claims."

Contrary to the examiner's assertion, however, appellant's specification does set forth a statement of utility that corresponds in scope to the subject matter claimed. Specifically, appellant discloses (specification, page 16), "[a]nother class of agents of the present invention are nucleic acid molecules having promoter regions or partial promoter regions, including those located within SEQ ID NO: 1...." As set forth in Raytheon, "[w]hen a properly claimed invention meets at least one stated objective, utility under § 101 is clearly shown."

Similarly, as set forth in Johns Hopkins Univ. v. CellPro Inc., 152 F.3d 1342, 1361, 47 USPQ2d 1705, 1714 (Fed. Cir. 1998), "[t]he enablement requirement is met if the description enables any mode of making and using the invention."

Therefore, it is the examiner's initial burden to establish that those skilled in this art would question the objective truth of the asserted utility. See In re Brana, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 ("Only after the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence."). In our opinion, the examiner has not provided sufficient evidence to

show that one of ordinary skill in the art would reasonably doubt that a nucleic acid molecule comprising SEQ ID NO: 1 would not have utility as a promoter as disclosed in appellants' specification.

To the contrary, the examiner has simply asserted (Answer, page 5) that "further experimentation would be required to reasonably confirm that SEQ ID NO: 1, or its complement, or fragments of either would function as a promoter as required by the claims. The specification does not provide any guidance as to the use of SEQ ID NO: 1, its complement or fragments thereof as promoters." Based on this assertion, the examiner concludes, "[t]he use of ... SEQ ID NO: 1 as a promoter is not a specific or substantial utility since further experimentation would be required to confirm that in fact SEQ ID NO: 1 has the ability to cause the production of an mRNA molecule...." Answer, page 6. While appellant has disclosed the characteristics of promoters within the scope of the claimed invention at pages 16-17 of the specification, the examiner fails to address this section of appellant's specification, or to establish a factual basis on this record to support the assertion that SEQ ID NO: 1 does not contain a promoter element.

According to the examiner (id.), "one would have to determine if the ... [promoter] is tissue specific or constitutive, for example, or if it is an inducible promoter, and under what circumstances it is induced or repressed in order to make use of the claimed plants." The examiner finds (id.), "[e]ach of these determinations is highly unpredictable, from the determination ... of the type of promoter it may be to the determination of fragments of the promoter that confer

promotion activity." The examiner, however, fails to establish a factual basis on this record to support these assertions.

Further, our review of this record is hindered by the examiner's failure to apply any type of claim construction to the claims now before us on appeal. In this regard, we note that claims 3 and 7, as well as the claims that depend from these claims, require in part "(A)" of each claim "an exogenous promoter region which functions ... to cause the production of a mRNA molecule." According to part "(A)" of these claims the promoter "comprises SEQ ID NO: 1 or a complement thereof...." We find no clear disclosure in the specification that SEQ ID NO: 1 is capable of functioning as a promoter region in plant cells to cause the production of a mRNA molecule. As we understand it, part "(A)" of these claims is open to at least three possible interpretations:

1. SEQ ID NO: 1 contains a promoter region which does function in plant cells to cause the production of a mRNA molecule,
2. SEQ ID NO: 1 does not contain a "promoter region," but instead contains a "regulatory element"² that acts in concert with a promoter region operably attached, either 5' or 3', to SEQ ID NO: 1, and thereby serves to regulate the expression of a mRNA molecule. For example, SEQ ID NO: 1 is an enhancer regions which is incapable of acts on a promoter, but is insufficient to function in plant cells to cause the production of a mRNA molecule on its own, or
3. SEQ ID NO: 1 contains neither a promoter region nor a regulatory element and simply serves as a filler sequence between the promoter region and a structural nucleic acid molecule, as defined in part "(B)" of these claims. For example, SEQ ID NO: 1 is incapable of functioning in plant cells to cause the production of a mRNA molecule, but instead serves only to

² See e.g. appellant's specification, page 17.

maintain the proper distance between a promoter and a "regulatory element."

It may be that the examiner is of the opinion that SEQ ID NO: 1 does not contain a promoter element. Cf. Interpretation 3 above. The examiner, however, has not provided a sufficient evidentiary basis on this record to establish that SEQ ID NO: 1 does not contain a promoter or regulatory region, or if it does, why a person of ordinary skill in the art would reasonably doubt that the sequence would not function as a promoter or regulatory region.

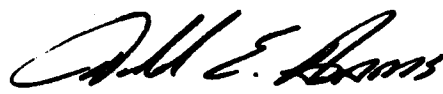
For the foregoing reasons we remand the application to the examiner for further consideration. Prior to any further action on the merits, we encourage the examiner to take a step back and reconsider the claimed invention together with appellant's specification and the relevant prior art. In this regard, we remind the examiner as set forth in In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), "claims must be interpreted as broadly as they reasonably, allow, in order to achieve complete exploration of applicant's invention and its relationship to prior art, so that ambiguities can be recognized, scope and breadth of language explored, and clarification imposed." Accordingly, prior to taking any action on the record, we encourage the examiner to determine the broadest reasonable interpretation of the claimed invention and to include an analysis of this claim construction in any subsequent Office Action. If, after the examiner has evaluated the scope of the claim, the examiner believes that a rejection is necessary, the examiner should include on this record, an analysis of the claim construction together with a reasoned, fact-

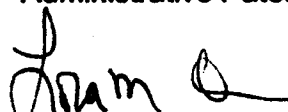
based analysis of claimed invention together with the evidence necessary to support any such rejection.

In addition, we note that appellant has disclosed and argued that a nucleic acid molecule comprising SEQ ID NO: 1 has a number of utilities, e.g., for identifying the presence or absence of a polymorphism, or as probes for other molecules or as a source for primers (see e.g., Brief, pages 7-11). These issues and arguments, however, bear a close resemblance to those presented in Ex parte Fisher, 72 USPQ2d 1020 (Bd. Pat. App. & Int. 2004) (affirming the rejection of claim 1 under 35 U.S.C. § 101 and § 112, first paragraph.). Accordingly, we encourage both the examiner and appellants to take the opportunity to reconsider their arguments on this record and to take into account the effect, if any, that Fisher may have on the issues under 35 U.S.C. § 101 and § 112, first paragraph.

REVERSED-IN-PART and REMANDED


William F. Smith
Administrative Patent Judge


Donald E. Adams
Administrative Patent Judge


Lora M. Green
Administrative Patent Judge

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) BOARD OF PATENT
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Appeal No. 2004-1772
Application No. 09/552,087

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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 26

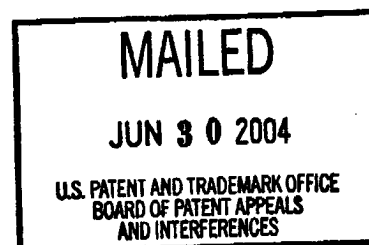
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte DAVID K. KOVALIC and JINGDONG LIU

Appeal No. 2003-1744
Application No. 09/654,617

HEARD: June 8, 2004



Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent Judges.

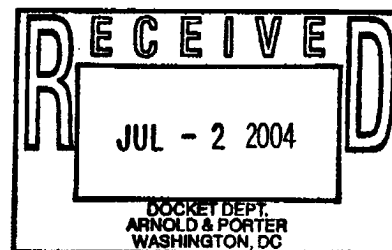
ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 11-17. Claim 12 is illustrative of the subject matter on appeal and is reproduced below:

12. A substantially purified nucleic acid molecule comprising from about 50 to about 100 nucleotide residues of the nucleic acid sequence set forth in SEQ ID NO: 13,782.

The examiner does not rely on a reference.



GROUND OF REJECTION

Claims 11-17 stand rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility. Claims 11-15 stand rejected under 35 U.S.C. § 112, first paragraph, as the specification fails to provide an adequate written description of the claimed invention. We affirm the utility rejections under 35 U.S.C. § 101 and § 112, first paragraph. Having disposed of all claims on appeal, we do not reach the written description rejection.

BACKGROUND

According to appellants' specification (page 1), "[t]he invention relates to nucleic acid sequences from plant cells, in particular, nucleic acid sequences from maize, teosinte, soybean, Arabidopsis, cotton, sorghum, rice and wheat." The specification also discloses (id., page 13), "[n]ucleic acid molecules of the present invention also include non-maize, non-sorghum, non-cotton and non-teosinte homologues. Preferred plant sources of homologues are selected from the group consisting of alfalfa, barley, Brassica, broccoli, cabbage, citrus, garlic, oat, oilseed rape, onion, canola, flax, an ornamental plant, pea, peanut, pepper, potato, rice, rye, strawberry, sugarcane, sugarbeet, tomato, poplar, pine, fir, eucalyptus, apple, lettuce, lentils, grape, banana, tea, turf grasses, sunflower, oil palm and Phaseolus." More particularly, appellants disclose "[t]he present invention provides a substantially purified nucleic acid molecule where the nucleic acid molecule comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 463,173 or complements

thereof or fragments of either;" or nucleic acid molecules that share between 90% to 100% sequence identity with one or more of the nucleic acid sequences set forth in SEQ ID NO: 1 through SEQ ID NO: 463,173 or complements thereof or fragments of either. See e.g., specification, pages 3 and 11.

The original claims filed with the application were directed to all 463,173 nucleic acid sequences. On August 23, 2001 (Paper No. 6), the examiner entered a Restriction requirement into the record, requiring, inter alia, appellants to elect a single nucleic acid sequence for consideration on the merits. Paper No. 6, page 3. In response, appellants elected SEQ ID NO: 13,782.

CLAIM GROUPING

According to appellants (Brief, page 2), "[p]atentability of claims 11-17 is addressed together in sections 8.A through 8.D below." We understand appellants' statement to mean that claims 11-17 stand or fall together. Accordingly, we limit our discussion to representative independent claim 12. Claims 11 and 13-17 will stand or fall together with claim 12. In re Young, 927 F.2d 588, 590, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991).

CLAIM CONSTRUCTION

As set forth above, claim 12 on appeal is drawn to a substantially purified nucleic acid molecule comprising from about 50 to about 100 nucleotide residues of the nucleic acid sequence set forth in SEQ ID NO: 13,782. According to

appellants' specification (bridging paragraph, pages 8-9), the term "substantially purified"

refers to a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

As we understand the subject matter of claim 12 the transitional term "comprising" does not allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequence set forth in SEQ ID NO: 13,782, but instead only allows for the addition of nucleotides or other molecules¹ at either end of the nucleotide sequence set forth in SEQ ID NO: 13,782. In this regard, we recognize, as does the examiner (Answer, page 4), the claim as written encompasses, inter alia, any full length gene, fusion construct, RNA or cDNA that contains about 50 nucleotide to about 100 nucleotide residues of the nucleic acid sequence set forth in SEQ ID NO: 13,782.

Accordingly, for the purposes of our review, we interpret the claimed invention as drawn to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, that comprises about 50 to about 100 nucleotide residues of the nucleic acid molecule defined

¹ According to appellants' specification (page 9), "agents of the present invention may be labeled with reagents that facilitate detection of the agent (e.g., fluorescent labels, ... chemical labels, ... [and] modified bases...."

by the nucleotide sequence set forth in SEQ ID NO: 13,782 with or without any preceding or trailing nucleotides, or other molecules.

DISCUSSION

Utility

The starting point for determining whether the nucleic acid molecule of claim 12 possesses utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). As set forth in Brenner, at 534-35, 148 USPQ at 695²,

the basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until [an invention] is refined and developed to this point--where specific benefit exists in currently available form--there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

In considering the issues presented in this appeal, special attention must be paid to the Brenner court's statement that a patent should issue only when an invention possesses "substantial utility," i.e., "where a specific benefit exists in currently available form." Whether a claimed invention is useful under 35 U.S.C. § 101 is a question of fact. Cross v. Iizuka, 753 F.2d 1040, 1044 n.7, 224 USPQ 739, 742 n.7 (Fed. Cir. 1985).

² In discussing the issue of utility under 35 U.S.C. § 101, the Federal Circuit and the Court of Customs and Patent Appeals since Brenner, have used the phrases "substantial utility" and "practical utility" interchangeably. See e.g., Fujikawa v. Wattanasin, 93 F.3d 1559, 1563-1564, 39 USPQ2d 1895, 1898-1899 (Fed. Cir. 1996) ("It is well established that a patent may not be granted to an invention unless substantial or practical utility for the invention has been discovered and disclosed.").

At issue in Brenner was a claim to “a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced.” Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that “where a claimed process produces a known product it is not necessary to show utility for the product.” Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be “useful,” that “simple, everyday word can be pregnant with ambiguity when applied to the facts of life.” Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the “new and useful” phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man’s grasp and where little or nothing is wholly beyond the pale of “utility”—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.³

The Court, finding “no specific assistance in the legislative materials underlying § 101,” based its analysis on “the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the

³ The invention at issue in Brenner was a process, but the Court expressly noted that its holding “would apply equally to the patenting of the product produced by the process.” Id. at 535, 148 USPQ at 695-96.

other.” Id. at 532, 148 USPQ at 695. The Court concluded that “[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.” Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant’s argument that attenuating the requirement of utility “would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge.” The Court noted that, while there is value to encouraging disclosure, “a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development.” Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not “mean to disparage the importance of contributions to the fund of scientific information short of the invention of something ‘useful,’” and that it was not “blind to the prospect that

what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are." Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. "There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher' was recognized, and clearly rejected, by the Supreme Court" in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. "In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was 'plastic-like.'" Id. at 1203, 26 USPQ2d at 1605. "Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility." Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. Id. "[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there." Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for

the compound in question.” Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by “marshall[ing] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility.” Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be “useful” is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every “use”

that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442)....

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk, 376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best ... on the way to discovering a

practical utility for polypropylene at the time of the filing," but not yet there.

Ziegler, at 1203, 26 USPQ2d at 1605.

On this record, appellants' specification sets forth a number of utilities for the nucleic acid molecules of SEQ ID NO: 1 through SEQ ID NO: 463,173 including their use (1) as markers capable of detecting the level, pattern, occurrence or absence of a biological process, wherein the biochemical process is selected from among 55 different biochemical processes (specification, pages 3 and 16-19); (2) to express proteins from which antibodies can be made to immunoassay for the expressed protein or mimetics thereof (id. at pages 19-23); (3) in transforming or transfecting plants to either overexpress the encoded protein or block the expression of a target gene (id., pages 23-37, particularly page 34, last paragraph and page 35, third full paragraph); (4) to obtain other nucleic acid molecules from the same species, "including nucleic acid molecules that encode the complete coding sequence of a protein and promoters and flanking sequences of such molecules" (id., bridging paragraph, pages 37-38 and page 39); (5) to obtain nucleic acid homologues from other plants or organisms (id., pages 38-39); (6) to detect genetic polymorphisms (id., pages 39-44); (7) to monitor gene expression, e.g. through the use of a microarray (id., pages 44-51); (8) "to determine an attribute or feature (e.g. the presence or absence, location, correlation, etc.) of a molecule, cell, tissue or plant" (id., page 46-47); (9) "to identify a protein or fragment thereof that specifically binds to a nucleic acid molecule of the invention" (id., page 52).

We note, however, that the specification does not specifically disclose how to use a nucleic acid comprising from about 50 to about 100 nucleotide residues of the nucleic acid sequence set forth in SEQ ID NO: 13,782, as set forth in claim 12.⁴ To the contrary, the specification describes the aforementioned utilities as applicable to all of the nucleic acid molecules set forth in SEQ ID NO: 1 through SEQ ID NO: 463,173.

Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal, i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We shall focus on these asserted utilities first and then address the other arguments set forth in the briefing.

a. Polymorphisms

This utility is discussed at pages 40-44 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification, however, is not specific to the nucleotide molecule set forth in claim 12. To the contrary, according to appellants' specification (page 44, lines 7-8), "one or more [of the 463,173] nucleic acid molecule[s] or fragment[s] thereof of the invention can be used as a probe in accordance with the above-described polymorphic methods." The specification does not explain why any of the 463,173 nucleic acid molecules disclosed in the specification, or more specifically a nucleic acid

⁴ On this record, the examiner finds "[t]here is no specific use particularly linked to the nucleic acids of the elected SEQ ID NO." Answer, page 3.

molecule comprising from about 50 to about 100 nucleotide residues of the nucleic acid sequence set forth in SEQ ID NO: 13,782 would in fact be useful in detecting polymorphisms.

Rather, appellants argue (Brief, page 7), "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." In other words, appellants' position is that a nucleic acid by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by a nucleic acid, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage. As the examiner explains (Answer, page 11), appellants' specification defines "polymorphism" as

"a variation or difference in the sequence of the gene or its flanking regions that arises in some members of a species." It follows from this definition that if there is no "variation or difference in the sequence of the gene or its flanking regions" among "members of a species," then no polymorphism exists, i.e. a polymorphism is absent, in this region of the genome.

According to the examiner (Answer, page 10), "the presence or absence of the claimed nucleotide sequence in a sample (or polymorphisms thereof) has no meaning absent some association. Further experimentation is required to

determine what, if any, that meaning or association might be." In this regard, the examiner finds (Answer, page 11), appellants' specification "does not disclose whether the claimed nucleic acid molecules can, in fact, be used to detect any polymorphism whatsoever. Thus, the specification leaves open the possibility that there may be no polymorphism to detect." According to the examiner (Answer, bridging paragraph, pages 11-12), "[t]he specification generally teaches using a polymorphism, detectable with the claimed nucleic acid molecules, as a molecular marker for a linked trait of interest, but fails to teach either the polymorphism or the trait of interest." According to the examiner (Answer, page 13), "the specification fails to identify even one specific polymorphism that can be detected with the claimed nucleic acid molecule, the specification fails to show any specific correspondence between the disclosed general utility and the claimed subject matter, regardless of any specific application requiring detection of polymorphisms." Accordingly the examiner finds (id.), "using the claimed invention to first determine whether or not the claimed nucleic acid molecule can, in fact, detect a polymorphism is to determine whether or not the claimed invention has a utility that requires detecting a polymorphism, i.e. it is 'use testing' and not substantial."

In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the nucleic acid is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the

gene and its role in the plant's development and/or phenotype lies the line between "utility" and "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.⁵

b. Probes or source of primers

Appellants assert that the "specification discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms...." Brief, page 8. While that may be true, it begs the question of what substantial use such nucleic acid molecules would have? Again, the present specification does not attribute any property in terms of plant trait, or phenotype to the nucleic acid set forth in claim 12. In the absence of such information, using the claimed molecule to isolate other molecules, which themselves lack substantial utility, does not represent a substantial utility.⁶

Appellants also assert that the claimed nucleic acid molecule may be used in a "chromosome walk." Brief, page 8. According to appellants (Brief, page 9),

The claimed nucleic acid molecules provide a particularly appropriate and demonstrably useful starting point for a walk to isolate a promoter that is active in Arabidopsis. A random nucleic acid molecule does not provide an equally good starting point to isolate such a promoter. Furthermore, even if a random nucleic acid molecule provided a better starting point than the claimed

⁵ For the foregoing reasons, we disagree with appellants' assertion (Brief, page 3), claimed nucleic acid molecule provides "at least one specific benefit to the public, for example the ability to identify the presence or absence of a polymorphism in a population of Arabidopsis."

⁶ According to the examiner (Answer, page 14), "since further research is needed to determine what, if any, real world utility the 'other nucleic acid molecules' may have, the use of the claimed nucleic acid for obtaining the 'other nucleic acid molecules' falls short of a substantial utility."

nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules.

As we understand this argument, the claimed nucleic acid may be useful in searching for promoters that active in Arabidopsis. The specification, however, fails to demonstrate that the nucleic acid molecule set forth in claim 12 would be useful in obtaining a successful result from such a search. As set forth at page 39, lines 15-20 of appellants' specification,

The [463,173] nucleic acid molecules of the present invention may be used to isolate promoters of cell enhanced, cell specific, tissue enhanced, tissue specific, developmentally or environmentally regulated expression profiles. Isolation and functional analysis of the 5' flanking promoter sequences of these genes from genomic libraries, for example, using genomic screening methods and PCR techniques would result in the isolation of useful promoters and transcriptional regulatory elements.

The specification does not provide any expectation of successfully using any of the 463,173 nucleic acid molecules disclosed in the specification, or more specifically the nucleic acid molecule of claim 12 to isolate promoters of cell enhanced, cell specific, tissue enhanced, tissue specific, developmentally or environmentally regulated expression profiles.

According to the examiner (Answer, page 15), "the specification fails to disclose any characteristics of the corresponding promoter, or any other promoter within 'chromosome walking' distance; neither structural characteristics, by which the promoter might be identified, nor functional characteristics, by which a specific and substantial use for the promoter might be determined." By

way of example, the examiner argues (Answer, page 16), assume

a nucleotide sequence is identified during the chromosome walk as a putative promoter by sequence analysis, is then subcloned into operable linkage with a reporter gene and transfected into an appropriate cells, but found not to express the reporter gene in the cells. This result could mean the putative promoter: is not truly a promoter, i.e. a false positive; is not the corresponding promoter; or is incomplete, i.e. lacked additional sequence elements required for promoter activity in the seed pod cells.

According to the examiner (Answer, page 9), appellants merely isolated the claimed nucleic acid molecule, "[t]hey have not tested, evaluated, or calibrated the claimed nucleotide sequence for any particular use."

We recognize appellants' argument (Brief, page 9), "[a]n invention may be 'less effective than existing devices but nevertheless meet the statutory criteria for patentability.' Custom Accessories, Inc. v. Jeffrey-Allan Indus., 807 F.2d 955, 960 n.12, 1 U.S.P.Q.2d 1196, 1199 n.12 (Fed. Cir. 1986)." While we agree with appellants' statement, we fail to see how it applies to appellants' claimed invention, wherein there is no evidence or expectation that the claimed nucleic acid molecules would be "effective" at all. In this regard, we remind appellants that an invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695.

An invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful

as analgesics. On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

c. Other Arguments

Appellants argue that the specification "discloses additional utilities for the claimed nucleic acid molecules including introduction of the claimed nucleic acid molecules into a plant or plant cell (either as sense or antisense inhibitors), which can then be used to screen for compounds such as a herbicide or traits such as disease resistance." Brief, page 5. Specifically, appellants argue (*id.*) that "a compound can be provided to both an antisense plant and a control plant (no antisense) and the effect of the compound on the plant can be monitored." Appellants analogize this proposed procedure to a "cell-based assay" which appellants assert to have a "legally sufficient utility." Brief, bridging sentence, pages 5-6.

However, the examiner finds (Answer, page 6), further research is required to use of the claimed nucleic acid molecule's use to detect the presence and/or identity of polymorphisms, as hybridization probes for expression profiling,

as antisense inhibitors by introduction of the claimed nucleic acid molecule into a plant or plant cell where the resulting cell or plant is to be used to screen compounds such as herbicides, to measure the level of mRNA in a sample, and as a molecular marker. In addition, the examiner finds (id.), that since targets are not disclosed in the specification, the use of the claimed nucleic acid molecule "as antisense inhibitors would require further experimentation to determine the target of inhibition." To the extent that appellants would argue that the claimed nucleic acid could be used in assays that measure the presence of a material that correlates to a predisposed disease condition, the examiner finds (Answer, page 7), "[t]he instant specification sets forth no such correlation for any condition."

As to the use of the claimed nucleic acid in microarrays (see e.g., Brief, page 6, n. 3), the examiner finds (Answer, page 7), "[a]ppellant is [sic] not claiming microarrays or collections of nucleotides and the specification does not associate the claimed sequence with any trait of interest." According to the examiner (Answer, page 8),

locating and measuring nucleic acid molecules within a sample is not a substantial use because it takes further research to determine any substantial use of the results of locating and measuring. The specification discloses no substantial uses of locating and measuring any nucleic acid molecule that does not consist or comprise SEQ ID NO: 13[.]782.

In addition, the examiner acknowledges appellants' assertion (Brief, page 5, n. 1), "[i]t is irrelevant whether the corresponding mRNA or polypeptide have utility because [a]pplicants are not relying on utility of the mRNA or polypeptide to

establish utility of the claimed nucleic acid molecules." Answer, page 6.

Nevertheless, the examiner asserts (id.), "[t]he [B]rief does not dispute that no open reading frame (ORF), no encoded protein, nor any biological activity for any encoded protein has been disclosed for SEQ ID NO: 13[,]782."

As for non-asserted utilities, the examiner finds (Answer, bridging paragraph, pages 3-4), "[n]either the specification as filed nor any art of record discloses or suggests any property or activity for the nucleic acid and/or protein compound(s) such that another non-asserted utility would be well established for the elected nucleic acid compound."

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. In regard to microarrays, we find that the asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form. We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid molecule set forth in claim 12. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification simply provides no guidance regarding what the specific information derived from a gene expression experiment would mean in the context of a nucleic acid molecule as set forth in claim 12.

To highlight the examiner's assertion (Answer, pages 7-8), suppose, for example, that a researcher found that expression of the nucleic acid molecule set forth in claim 12 was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be able to determine whether that result is meaningful. Maybe the meaning in a change in expression would depend on other factors, but again the specification provides no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), the degree of increase? The specification simply provides no guidance as to how to interpret the results that might be seen using the nucleic acid molecule of claim 12 in a gene expression assay.

In effect, appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at 695. Here, appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility

because the specification did not disclose how to use the end-product, the products claimed here lack utility, because even if used in gene expression assays, the specification does not disclose how to use the specific gene expression data in the context of the nucleic acid molecule of claim 12.

Assuming arguendo, that a generic gene expression assay - one based on monitoring expression of thousands of uncharacterized nucleic acids - would provide a useful tool for, e.g., drug discovery, it does not follow that each one of the nucleic acids represented in the assay individually has patentable utility.

Although each nucleic acid in the assay contributes to the data generated by the assay overall, the contribution of a single nucleic acid—its data point—is only a tiny contribution to the overall picture. The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form.

Providing a single data point among thousands or millions, even if the thousands or millions of data points collectively are useful, does not meet this standard.

The Supreme Court noted that the patent system contemplates a basic quid pro quo: in exchange for the legal right to exclude others from his invention for a period of time, an inventor discloses his invention to the public. See Brenner, 383 U.S. at 534, 148 USPQ at 695. The Brenner Court held that the grant of

patent rights to an applicant is justified only by disclosure of an invention with substantial utility – a specific benefit in currently available form. Until the invention has been refined and developed to this point, the Court held, the applicant has not met his side of the bargain, and has not provided a disclosure sufficient to justify a grant of the right to exclude others. See id.

We reach the same conclusion in regard to appellants' assertion that the nucleic acid molecule set forth in claim 12 is useful as a molecular marker or probe. It is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 12 as a molecular marker or probe represents a substantial use.

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Brief, page 10. Since appellants fail to provide any suggestion on which use of ESTs this industry is premised on, we can only assume that appellants are referring to the potential usefulness of EST databases, clone sets or microarrays. Suffice it to say, the claims on appeal are not directed to EST databases, clone sets and/or microarrays. Again, it is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 12 in such devices represents a substantial use.

Further, we understand appellants' position to be that a compound would be patentable if it was adequately described in the specification and was not disclosed or suggested in the prior art. This standard, however, is not the one

set by Congress, which requires that a patentable invention also be useful and fully enabled, nor is it the standard that has been consistently applied by the courts.

Not only is appellants' proposed utility standard contrary to controlling case law, but there are reasons to expect that it would hurt – rather than help – the microarray industry. Under appellants' standard, any naturally occurring gene, and fragments thereof, would be held to have patentable utility based on its use in generating expression data. The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating the patent status of each oligonucleotide on the microarray. Not only that, but since appellants assert that their reasoning supports the utility of gene fragments, all of the subsequences of each of the genes or polypeptides would have to be checked to ensure that it was not the subject of someone else's patent.

For each of the genes (or fragments thereof) that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each new product that an aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a "tragedy of the anticommons":⁷

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate

⁷ Heller et al., "Can patents deter innovation? The anticommons in biomedical research," *Science*, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859).... To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

The basic quid pro quo of the patent system requires disclosure of an invention having substantial utility. Appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101.

For the foregoing reasons we affirm the rejection of claim 12 under 35 U.S.C. § 101. As discussed supra, claims 11 and 13-17 fall together with claim 12.

Enablement

According to the examiner (Answer, page 4), "since the claimed invention lacks patentable utility due to its not being supported by a specific, substantial, and credible utility or, in the alternative, a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." This rejection is simply a corollary of the finding of lack of utility. Appellants assert (Brief, page 12), this rejection should be reversed for the same reasons set forth in their arguments regarding the rejection under 35 U.S.C. § 101. Thus, our conclusion with respect to the § 101 issue will also apply to this aspect of the § 112 (enablement) issue. On this basis we affirm the rejection of claim 12 under the enablement provision of 35 U.S.C. § 112, first paragraph. As discussed supra, claims 11 and 13-17 fall together with claim 12.

Written description

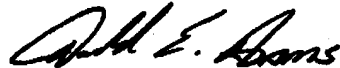
Having disposed of all claims on appeal we do not reach the merits of the rejection under the written description provision of 35 U.S.C. § 112, first paragraph.

No time period for taking any subsequent action in connection with this
appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED



William F. Smith
Administrative Patent Judge



Donald E. Adams
Administrative Patent Judge



Eric Grimes
Administrative Patent Judge

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) APPEALS AND
) INTERFERENCES
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Appeal No. 2003-1744
Application No. 09/654,617

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ARNOLD & PORTER LLP
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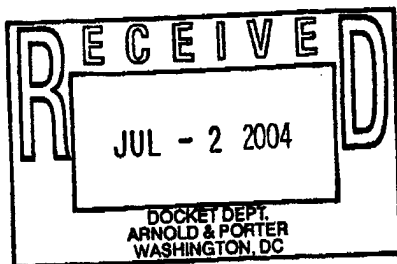
The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

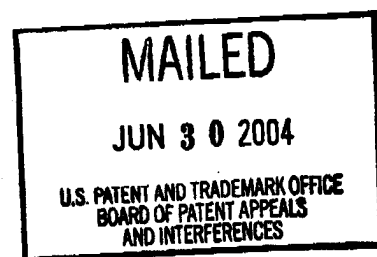
**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte ANDREY A. BOUKHAROV,
YONGWEI CAO, DAVID K. KOVALIC,
JINGDONG LIU, JAMES MCININCH,
and WEI WU



Appeal No. 2003-1746
Application No. 09/620,392

HEARD June 8, 2004



Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent Judges.
GRIMES, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-4, 6-9, and 16-20, all of the claims remaining. Claims 1 and 2 are representative and read as follows:

1. A substantially purified nucleic acid molecule having a nucleic acid sequence of SEQ ID NO:1 or complement thereof.
2. A substantially purified nucleic acid molecule comprising a fragment nucleic acid sequence having from about 50 to about 100 nucleotide residues; wherein said fragment nucleic acid sequence exhibits complete complementarity to a second nucleic acid molecule having a nucleic acid sequence of SEQ ID NO:1 or complement thereof.

The examiner does not rely on any prior art.

Claims 1-4, 6-9, and 16-20 stand rejected under 35 U.S.C. §§ 101 and 112, first paragraph, as lacking patentable utility.

Claims 1-4, 6-9, and 16-20 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking adequate written description.¹

We affirm the utility rejections and reverse the description rejection.

Background

The subject matter of the present appeal is directed to "genomic DNA sequences from Oryza sativa (rice) plants." More specifically, the "invention provides a substantially purified nucleic acid molecule, the nucleic acid molecule capable of specifically hybridizing to a second nucleic acid molecule having a nucleic acid sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:69652 or complements thereof or fragments of either."

According to the specification,

[a] subset of the nucleic acid molecules of the present invention includes nucleic acid molecules that are marker molecules. Another subset of the nucleic [acid] molecules of the present invention includes nucleic acid molecules that are promoters and/or regulatory elements. Another subset of the nucleic acid molecules of the present invention includes nucleic acid molecules that encode a gene or fragment thereof. Another subset of the nucleic acid molecules of the present invention encodes proteins or fragments of proteins.

Page 17. The specification provides no further guidance on which of the 69,652 disclosed sequences fall into each of these subsets.

¹ The examiner's statement of the rejection actually speaks in terms of lack of enablement. See the Examiner's Answer, page 5 (The claims "contain[] subject matter which lacks written description in the specification in such a way as to enable one skilled in the art . . . to make and/or use the invention."). The

The originally filed claims encompassed all of the 69,652 disclosed sequences. See, e.g., original claim 1 (specification, page 55,578).² On June 18, 2001 (Paper No. 7), the examiner entered a restriction requirement into the record, requiring appellants to elect, inter alia, a single nucleotide sequence for examination on the merits. Paper No. 7, page 2. In response, Appellants elected SEQ ID NO:1. See Paper No. 8, received July 17, 2001.

The disclosure that relates specifically to SEQ ID NO:1 is found in the specification's Table 1 and reads as follows, in its entirety:

Seq No.	1	Seq. ID	OJ990503_31.9819.C2
Gene No.	1	Strand	-
Start	397	End	1864
Name	OJ990503_31.9819.C2.o1.gs	Method:	GENSCAN
Start	397	End	1238
GI	none	Score	.93
Exons	397.. 591, 879.. 1238		
Seq No.	1	Seq. ID	OJ990503_31.9819.C2
Gene No.	1	Strand	-
Start	397	End	1864
Name	OJ990503_31.9819.C2.o1.tm	Method:	TBLASTX:Maize
Start	1017	End	1864
GI	none	Score	150
Exons	1017.. 1250, 1018.. 1245, 1020.. 1247, 1243.. 1296, 1249.. 1296, 1377.. 1418, 1382.. 1420, 1532.. 1600, 1534.. 1596, 1706.. 1735, 1745.. 1864		

Page 104.

The specification sets forth a number of utilities for the claimed nucleic acid molecule which are characterized by the examiner as "[g]eneric to any rice nucleic acid

examiner's reasoning, however, explains the rejection in terms of lack of written description. We understand the rejection to be based on the written description requirement of § 112.

² The record is unclear as to precisely how many pages are in the specification. According to an error sheet generated by the USPTO's Office of Initial Patent Examination, the specification contains 68,885 pages; according to Appellants' page numbering, it contains only 55,580 pages. We have not attempted to resolve this discrepancy since it does not affect the issues on appeal.

sequences." Examiner's Answer, page 4. The examiner concluded that these uses do not establish patentable utility:

The claimed nucleic acids are not supported by a specific asserted utility because the disclosed uses of these nucleic acids are generally applicable to rice genomic nucleic acid. The specification states that the nucleic acid compounds are useful for gene mapping, marker assisted introgress[i]on of traits, physical mapping, etc. (page 9 and 49). All these possible uses are generic to any rice nucleic acid sequences. Further, the claimed nucleic acids are not supported by a substantial utility. . . . Identifying and studying the properties of a protein itself or the mechanisms in which the protein is involved does not define a "real world" context of use. Similarly, the other listed and asserted utilities as summarized above or in the instant specification are neither substantial nor specific due to being generic in nature and applicable to a myriad of such compounds.

Examiner's Answer, pages 3-4.

In presenting their case on appeal, appellants focus on use of the claimed nucleic acid molecules to identify the presence or absence of a polymorphism, and their use as probes or as a source for primers. See the Appeal Brief, pages 6-13. According to Appellants, "they have disclosed nucleic acid molecules which, in their current form, provide at least one specific benefit to the public, for example, the ability to identify the presence or absence of a polymorphism in a population of rice plants." Id., page 4. Furthermore, appellants assert, "[t]he specification discloses that the claimed nucleic acid molecules can be used . . . to isolate nucleic acid molecules of other plants and organisms." Id., page 9.

1. Claim construction

The claims stand or fall together. Appeal Brief, page 3. Claim 2 is the broadest claim on appeal and we will consider it as representative.

As set forth above, claim 2 is directed to a "substantially purified" nucleic acid molecule that comprises a "fragment nucleic acid sequence having from about 50 to about 100 nucleotide residues"; where the 50-100 nucleotide sequence "exhibits complete complementarity to a second nucleic acid molecule having a nucleic acid sequence of SEQ ID NO:1" or its complement.

The specification defines "substantially purified" to mean

a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

Page 16, lines 12-18. As we understand the claimed invention, the use of the transitional term "comprising" does not allow for internal alterations (e.g., insertions or deletions) of the "fragment nucleic acid sequence" recited in the claim, but instead only allows for the addition of nucleotides or other molecules at either end of that sequence. Thus, claim 2 encompasses, inter alia, genes and fragments thereof, full or partial open reading frames, fusion constructs, and cDNAs.

Accordingly, we interpret claim 2 as directed to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, that includes at least about 50 nucleotides that are completely complementary to a part of SEQ ID NO:1 or to the complement of a part of SEQ ID NO:1.

2. Utility

The starting point for determining whether the claimed nucleic acid molecules possess utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). At issue in Brenner was a claim to “a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced.” Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that “where a claimed process produces a known product it is not necessary to show utility for the product.” Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be “useful,” that “simple, everyday word can be pregnant with ambiguity when applied to the facts of life.” Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the “new and useful” phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man’s grasp and where little or nothing is wholly beyond the pale of “utility”—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.³

³ The invention at issue in Brenner was a process, but the Court expressly noted that its holding “would apply equally to the patenting of the product produced by the process.” Id. at 535, 148 USPQ at 695-96.

The Court, finding "no specific assistance in the legislative materials underlying § 101," based its analysis on "the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the other." Id. at 532, 148 USPQ at 695. The Court concluded that "[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant's argument that attenuating the requirement of utility "would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge." The Court noted that, while there is value to encouraging disclosure, "a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the

compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are.” Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. “There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of ‘useful in research’ or ‘useful as building blocks of value to the researcher’ was recognized, and clearly rejected, by the Supreme Court” in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. “In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was ‘plastic-like.’” Id. at 1203, 26 USPQ2d at 1605. “Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility.” Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. Id. “[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there.” Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for the compound in question." Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by

“marshal[ing] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility.” Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be “useful” is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every “use” that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy

§ 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk, 376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best ... on the way to discovering a practical utility for polypropylene at the time of the filing," but not yet there. Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

With these principles in mind we turn to the issues at hand. Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal; i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We will focus on these asserted utilities first.

a. Polymorphisms

This utility is discussed at pages 57-64 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification, however, is not specific to SEQ ID NO:1. To the contrary, according to the specification, "[t]he [69,652] nucleic acid molecules of the present invention can be used to identify polymorphisms. In one embodiment, one or more of the nucleic acid molecules . . . may be employed as a marker nucleic acid molecule to identify . . . polymorphism(s)." Page 57. The specification does not explain why any particular one of the 69,652 nucleic acid molecules disclosed in the specification, or more specifically SEQ ID NO:1, would in fact be useful in detecting polymorphisms.

Rather, Appellants argue that "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." Appeal Brief, page 9. In other words, Appellants' position is that a rice genomic DNA by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by a nucleotide sequence, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage. As the examiner explains,

[a] "polymorphism" is a collective concept defined by at least two variants (or alleles) found within members of a species collectively. Thus, one detects the presence of a polymorphism by analyzing multiple members of the species, i.e. analyzing a population. . . . The specification fails to disclose a specific and substantial utility for the claimed invention in the capacity of detecting polymorphisms, because it does not disclose whether the claimed nucleic acid molecules can, in fact, be used to detect any polymorphism whatsoever. . . .

The specification generally teaches using the claimed polynucleotides to identify a polymorphism, but fails to teach that a polymorphism could in fact be detected, or a specific polymorphism that could be detected. The specification generally teaches using a polymorphism, detectable with the claimed nucleic acid molecules, as a molecular marker for a linked trait of interest, but fails to teach either the polymorphism or the trait of interest.

Examiner's Answer, pages 12-13. In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene represented by the claimed sequence has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the gene and its role in the plant's development and/or phenotype lies the line that defines "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.

b. Probes or source of primers

Appellants argue that the "specification discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms." Appeal Brief, page 9. That may be true, but it does not show the patentable utility of the claimed nucleic acids, because the nucleic acids isolated from other plants have no apparent, substantial use. Again, the present specification does not attribute any property in terms of plant trait or phenotype to SEQ ID NO:1. In the absence of such information, nucleic acids from other plants that hybridize to the claimed nucleic acids themselves lack substantial utility. Thus, the use of the claimed nucleic acids to isolate such nucleic acids does not represent a substantial utility.

Appellants also assert that the claimed nucleic acid molecules may be used in a "chromosome walk." Appeal Brief, pages 10-11. According to Appellants,

[t]he claimed nucleic acid molecules provide a particularly appropriate and demonstrably useful starting point for a walk to isolate a promoter that is active in Oryza sativa. A random nucleic acid molecule does not provide an equally good starting point to isolate such a promoter. Furthermore, even if a random nucleic acid provided a better starting point than the claimed nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules.

Id., page 10. As we understand it, Appellants' argument is that the claimed nucleic acids may be useful in searching for promoters that are active in rice tissues.

The specification, however, fails to demonstrate that the nucleic acid represented by SEQ ID NO:1 would be useful in obtaining a successful result from such a search. The specification states that "[a]nother class of agents of the present invention are nucleic acid molecules having promoter regions or partial promoter regions within SEQ ID NO:1 through SEQ ID NO:69652." Page 27.

Promoters . . . include, but are not limited to, oxygen responsive cis elements . . . , light regulatory elements . . . , elements responsive to gibberellin . . . , elements responsive to abscisic acid . . . , elements similar to abscisic acid responsive elements . . . , auxin responsive elements . . . , ethylene responsive cis elements . . . , sucrose responsive elements . . . , heat shock response elements . . . , Elicitor responsive elements . . . , drought responsive elements . . . , light-independent regulatory elements . . . , ACGT elements . . . , [and] prolamin box elements.

Pages 28-32.

The specification does not provide any expectation of successfully using any of the 69,652 nucleic acid molecules disclosed in the specification, or more specifically the nucleic acid of SEQ ID NO:1, to isolate any of the promoters exhaustively listed in the specification, or any other promoter. Even if SEQ ID NO:1 represents a gene that is expressed in rice tissue, the specification provides no characterization of its expression (e.g., amount expressed, timing of expression, tissues in which or conditions under which it is expressed) that would suggest a utility for its putative promoter.

It is true, as Appellants argue, that "[a]n invention may be 'less effective than existing devices but nevertheless meet the statutory criteria for patentability.'" Appeal Brief, page 11. However, with Appellants' claimed invention, there is no evidence or expectation that the claimed nucleic acid molecules would be "effective" at all. An invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form. See Brenner, 383 U.S. at 534, 148 USPQ at 695.

Appellants argue that the claimed nucleotide sequences are no less useful just because other nucleic acids can also be used to isolate promoters. See the Appeal Brief, page 10: "[T]he Examiner suggests that the asserted utilities are legally

insufficient simply because other molecules can be used for the same purpose. This position is wrong as a matter of law – there is no requirement of exclusive utility in the patent law.”

This argument is not persuasive. Appellants have not been asked to identify a utility that is unique, i.e., not shared by any other compounds or compositions. Rather, Appellants have been required to identify a utility that is specific to the invention claimed, as opposed to one that would apply regardless of the specific properties of the claimed invention. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695 (An invention does not have utility sufficient to satisfy § 101 until it is “refined and developed” to the point of providing a specific benefit in currently available form.).

An invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful as analgesics.

On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

Here, Appellants argue that asserted "chromosome walking" utility would support patentability even if the claimed nucleic acid molecule was less useful for this purpose than a totally random nucleotide sequence. Appeal Brief, page 10 ("[E]ven if a random nucleic acid provided a better starting point than the claimed nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules."). Clearly, the asserted utility is not based on the specific properties of the claimed nucleic acid molecules.

c. Other arguments

Appellants argue that the specification "discloses additional utilities for the claimed nucleic acid molecules, including introduction of the claimed nucleic acid molecules into a plant or plant cell (either as sense or antisense inhibitors), which can then be used to screen for compounds such as a herbicide." Appeal Brief, page 6 (footnote omitted). Specifically, Appellants argue (id.) that "a compound can be provided to both an antisense plant and a control plant (no antisense) and the effect of the compound on the plant can be monitored." Appellants analogize this proposed procedure to a "cell-based assay" which, they assert, has a "legally sufficient utility." Id.

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. The portions of the specification cited in support of this argument (pages 69 and 86-88) indicate that the nucleic acid molecule must be introduced into a plant cell and transcribed using an appropriate promoter to result in either expression of the protein or suppression of an endogenous protein. The specification does not indicate that such a method is feasible when the nucleic acid to

be used is uncharacterized as here. Such a use does not provide a specific or substantial benefit in currently available form.

Appellants also argue that the claimed nucleic acids are useful to measure the level of mRNA in a sample through use of microarray technology and use as molecular markers. Appeal Brief, page 7. In regard to microarrays, Appellants argue (*id.*, n.3) that it is "standard practice" to screen populations of nucleic acids with EST sequences without characterizing each and every target mRNA. We find that this asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form.

We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid depicted in SEQ ID NO:1. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification provides no guidance regarding what the SEQ ID NO:1-specific information derived from a gene expression experiment would mean. As the examiner points out, "further experimentation is required to identify a 'real world use.' . . . A positive result to such a screen requires further experimentation to determine what, if anything, such a change means." Examiner's Answer, pages 8-9.

To highlight the examiner's assertion, suppose, for example, that a researcher found that SEQ ID NO:1 expression was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be

able to determine whether that result is meaningful. Maybe the meaning in a change in SEQ ID NO:1 expression would depend on other factors, but again the specification provides no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), or the degree of increase? The specification provides no guidance as to how to interpret the results that might be seen using SEQ ID NO:1 in a gene expression assay.

In effect, Appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at 695. Here, Appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility because the specification did not disclose how to use the end-product, the products claimed here lack utility, based on their use in gene expression assays, because the specification does not disclose how to use gene expression data pertaining to SEQ ID NO:1.

In addition, assuming arguendo that a generic gene expression assay—one based on monitoring expression of a collection of uncharacterized nucleic acids—would

provide a useful tool for, e.g., drug discovery, it does not follow that each of the nucleic acids in the assay necessarily has patentable utility. Although each nucleic acid in the assay contributes to the data generated by the assay overall, the contribution of a single nucleic acid—its data point—is only a tiny contribution to the overall picture.

The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form. Providing a single data point among thousands, even if the thousands of data points collectively are useful, does not meet this standard.

We also conclude that § 101's utility requirement is not satisfied by Appellants' assertion that the claimed nucleic acid molecules are useful as molecular markers or probes. Again, using one of the claimed nucleic acids as a molecular marker or probe to hybridize to part of a rice chromosome merely generates a single, uncharacterized data point that is useful only when combined with thousands of other data points. For the reasons discussed above in regard to gene expression assays, such uses do not represent "substantial" utility, as required by Brenner.

Appellants argue that ESTs (and presumably other uncharacterized nucleic acids – the claims on appeal are not directed to ESTs) have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Appeal Brief, page 12. Since Appellants fail to provide any

suggestion of which use of ESTs this industry is premised on, we can only assume that Appellants are referring to the potential usefulness of EST databases, clone sets, or microarrays. The claims on appeal, however, are not directed to EST databases, clone sets, or microarrays, but to individual, uncharacterized nucleic acids. Again, we do not agree that the one data point which may be provided by using the uncharacterized nucleic acid molecules of the claims in such devices represents a substantial use.

In addition, it is reasonable to expect that the rule Appellants proffer – that uncharacterized nucleic acids are individually patentable because they are useful in gene expression assays – would hurt, rather than help, what they characterize as a “multi-million dollar industry in the United States premised on the usefulness of ESTs.” Under Appellants’ standard, any uncharacterized nucleic acid from most (if not all) organisms would be held to have patentable utility based on its use in generating gene expression data.⁴ The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating all of the DNA sequences on the microarray to ensure that they were not the subject of someone else’s patent.

For each of the DNAs that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each

⁴ We can take judicial notice of the fact that organisms are of interest for many different reasons, such that gene expression assays could conceivably be used in their research. Humans, of course, are of interest in medical research. Other organisms are of interest to researchers because they have been historically well-studied (e.g., yeast, Arabidopsis, Drosophila), or because they are used as animal models for testing pharmaceuticals (e.g., mice, chimpanzees, rabbits), or because they are commercially valuable (e.g., pigs, corn, tomatoes), or because they are pests (e.g., Fusarium, ragweed, corn borers, zebra mussels), or because they are pathogens (e.g., Candida, various bacteria, tapeworms).

new product that an aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a "tragedy of the anticommons".⁵

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859). . . . To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

The basic quid pro quo of the patent system requires disclosure of an invention having substantial utility. Appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101. We therefore affirm the rejection of claim 2 under 35 U.S.C. § 101. Claims 1, 3, 4, 6-9, and 16-20 fall with claim 2.

⁵ Heller et al., "Can patents deter innovation? The anticommons in biomedical research," Science, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

3. Enablement

The examiner rejected claims 1-4, 6-9, and 16-20 under 35 U.S.C. § 112, first paragraph, on the basis that "since the claimed invention lacks patentable utility due to its not being supported by a specific, substantial, and credible utility or, in the alternative, a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." Examiner's Answer, page 4. This rejection is simply a corollary of the finding of lack of utility.

Appellants argue that "[t]his rejection . . . has been overcome by the arguments stated above regarding utility." Appeal Brief, page 14. We do not agree that Appellants' arguments overcome the rejection for lack of utility. Thus, our conclusion with respect to the § 101 issue also applies to the nonenablement rejection. On this basis we affirm the rejection of claims 1-4, 6-9, and 16-20 under the enablement provision of 35 U.S.C. § 112, first paragraph.

4. Written description

The examiner rejected claims 1-4, 6-9, and 16-20 under 35 U.S.C. § 112, first paragraph, for lack of adequate written description, reasoning that

[c]laims 1-4, 6-9, and 16-20 are directed to nucleic acids comprising . . . SEQ ID NO:1, or fragments thereof. . . . [G]iven the broad scope of the claims, they are drawn to a genus: any polynucleotide or nucleic acid that minimally contains the sequence of the claimed SEQ ID NO, or a fragment thereof, including any full length gene which contains the sequence. . . . Since the claimed genus encompasses species yet to be discovered, the mere disclosure of a species: sequence of the claimed SEQ ID NO, does not provide an adequate description of the claimed genus. . . . With the exception of SEQ ID NO:1, the skilled artisan cannot envision the detailed chemical structure of the encompassed polynucleotide.

Examiner's Answer, page 5.

As we understand it, the basis of the examiner's rejection is that because of the transitional phrase "comprising", the claims encompass a large genus of nucleic acid molecules which are not adequately described by SEQ ID NO:1. See the Examiner's Answer, pages 18-20. Apparently, the examiner is of the opinion that the claimed invention should be limited to the nucleic acid molecules set forth in SEQ ID NO:1.

In response, Appellants argue that "[t]he fact that the claims at issue are intended to cover molecules that include the recited sequences joined with additional sequences . . . does not mean that Applicants were any less in possession of the claimed nucleic acid molecules." Appeal Brief, pages 15-16.

We have interpreted claim 2 to allow for the addition of nucleotides or other molecules at either end of the recited nucleotide sequences, but not to allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequence SEQ ID NO:1. See pages 4-5, supra. We agree with Appellants that the claims, as we have interpreted them, are supported by an adequate written description in the specification. The fact that the claimed nucleic acid molecules may have other molecules attached to either or both of their 5' or 3' ends does not diminish Appellants' adequate written description of the nucleic acids molecules with at least part of the sequence set forth in SEQ ID NO:1, as claimed.

Accordingly, we reverse the rejection of claims 1-4, 6-9, and 16-20 for lack of adequate written description.

Summary

Although we reverse the examiner's rejection for lack of adequate written description, we affirm the rejection of claims 1-4, 6-9, and 16-20 for lack of patentable utility.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


WILLIAM F. SMITH
Administrative Patent Judge


DONALD E. ADAMS
Administrative Patent Judge


ERIC GRIMES
Administrative Patent Judge

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) BOARD OF PATENT
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Appeal No. 2003-1746
Application No. 09/620,392

Page 27

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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 22

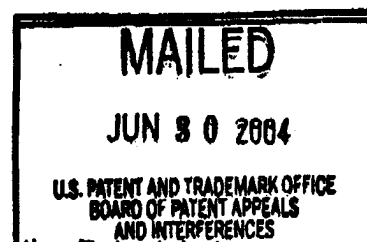
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

(15768)
Ex parte SCOTT E. ANDERSEN and JAMES D. MASUCCI

Appeal to C.A.F.C.
Appeal No. 2003-1137
Application No. 09/540,232
UnDocketed
Due Date 8/30/04
Initial as

ON BRIEF



Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent Judges.

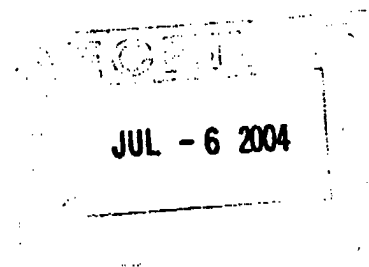
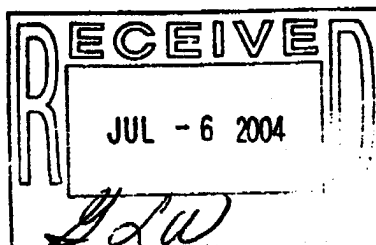
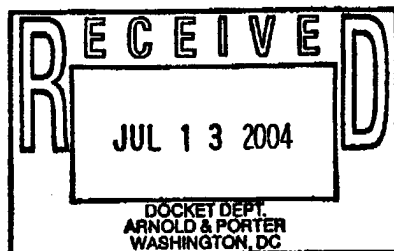
GRIMES, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 and 2, the only claims remaining. The claims read as follows:

1. A substantially purified nucleic acid molecule that encodes a plant protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:78, SEQ ID NO:93, SEQ ID NO:340, SEQ ID NO:1965, SEQ ID NO:1985, SEQ ID NO:1991, SEQ ID NO:1993, SEQ ID NO:4047, and SEQ ID NO:5683.

2. The substantially purified nucleic acid molecule according to claim 1, wherein said plant protein or fragment thereof is a lily protein or fragment thereof.



The examiner does not rely on any prior art.

Claims 1 and 2 stand rejected under 35 U.S.C. §§ 101 and 112, first paragraph, as lacking patentable utility.

Claims 1 and 2 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking an adequate written description in the specification.

We affirm the utility rejections and reverse the description rejection.

Background

The subject matter of the present appeal is directed to expressed sequence tags. "Expressed sequence tags, or ESTs, are short sequences of randomly selected clones from a cDNA (or complementary DNA) library which are representative of the cDNA inserts of these randomly selected clones." Specification, page 1.

As set forth at page 9 of the specification, "[t]he present invention provides a substantially purified nucleic acid molecule that encodes a lily protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:6167." The specification discloses that these ESTs were obtained from cDNA libraries prepared from asiatic lily early ovary or late ovule tissue. Pages 84-85.

The originally filed claims encompassed all of the 6167 disclosed sequences. On January 9, 2001 (Paper No. 4), the examiner entered a restriction requirement into the record, requiring appellants to elect, inter alia, up to ten nucleotide sequences for examination on the merits. Paper No. 4, page 2. In response, appellants elected SEQ ID NOs 78, 93, 340, 1954, 1965, 1985, 1991, 1993, 4047, and 5683. See Paper No. 5,

received Feb. 9, 2001. During prosecution, SEQ ID NO:1954 was deleted from the claims. See Paper No. 10, received Dec. 13, 2001.

The specification sets forth a number of utilities for the claimed nucleic acid molecules which are characterized by the examiner as "[g]eneral uses . . . includ[ing] acquiring genes, identifying polymorphisms, determining plant traits, and DNA mapping." Examiner's Answer, page 4. The examiner concluded that these uses do not establish patentable utility:

None of these [uses are] considered to be specific and substantial in view of the limited information provided in the specification. No plant traits are attributed to any SEQ ID NO. No complete gene is disclosed for any SEQ ID NO. No DNA maps or chromosomal locations are identified. No polymorphisms are identified. The specification does not disclose how a polymorphism would be recognized by those of ordinary skill in the art given the incomplete sequences disclosed.

Examiner's Answer, page 4.

In presenting their case on appeal, appellants focus on use of the claimed nucleic acid molecules to identify the presence or absence of a polymorphism, and their use as probes or as a source for primers. See the Appeal Brief, pages 6-13. According to Appellants, "they have disclosed nucleic acid molecules which, in their current form, provide at least one specific benefit to the public, e.g., the ability to identify the presence or absence of a polymorphism in a population of lily plants." *Id.*, page 3. Furthermore, appellants assert, "[t]he specification discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms." *Id.*, page 8.

Discussion

1. Claim construction

As set forth above, claim 1 is directed to a "substantially purified nucleic acid molecule that encodes a plant protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:78, SEQ ID NO:93, SEQ ID NO:340, SEQ ID NO:1965, SEQ ID NO:1985, SEQ ID NO:1991, SEQ ID NO:1993, SEQ ID NO:4047, and SEQ ID NO:5683." The specification defines "substantially purified" to mean

a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

Page 16, lines 12-18. As we understand the claimed invention, the use of the transitional term "comprising" does not allow for internal alterations (e.g., insertions or deletions) of the nucleotide sequences set forth in the recited SEQ ID NOs, but instead only allows for the addition of nucleotides or other molecules at either end of the nucleotide sequences of the recited SEQ ID NOs. Thus, claim 1 encompasses, inter alia, genes, full open reading frames, fusion constructs, and cDNAs.

The preamble of claim 1 also recites that the claimed nucleic acid "encodes a plant protein or fragment thereof." This phrase, however, merely recites an inherent function expected for the nucleotide sequences of the recited SEQ ID NOs; since the recited sequences were isolated as ESTs from lily tissue, they would be expected to

encode (parts of) lily proteins. Since the introductory phrase does not further limit the invention defined by the body of the claim, it is irrelevant to construction of the claim.

See IMS Technology, Inc. v. Haas Automation, Inc., 206 F.3d 1422, 1434, 54 USPQ2d 1129, 1137 (Fed. Cir. 2000) ("If the preamble adds no limitations to those in the body of the claim, the preamble is not itself a claim limitation and is irrelevant to proper construction of the claim.").

Accordingly, we interpret claim 1 as directed to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:78, SEQ ID NO:93, SEQ ID NO:340, SEQ ID NO:1965, SEQ ID NO:1985, SEQ ID NO:1991, SEQ ID NO:1993, SEQ ID NO:4047, and SEQ ID NO:5683, with or without any preceding or trailing nucleotides or other molecules.

2. Utility

The starting point for determining whether the claimed nucleic acid molecules possess utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). At issue in Brenner was a claim to "a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced." Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that "where a claimed process produces a known product it is not necessary to show utility for the product." Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be "useful," that "simple, everyday word can be pregnant with ambiguity when applied to the facts of life." Id. at 529, 148 USPQ at 693. Thus,

[I]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the "new and useful" phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man's grasp and where little or nothing is wholly beyond the pale of "utility"—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.¹

The Court, finding "no specific assistance in the legislative materials underlying § 101," based its analysis on "the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the other." Id. at 532, 148 USPQ at 695. The Court concluded that "[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant's argument that attenuating the requirement of utility "would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge." The Court noted that, while there

is value to encouraging disclosure, "a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to

¹ The invention at issue in Brenner was a process, but the Court expressly noted that its holding "would apply equally to the patenting of the product produced by the process." Id. at 535, 148 USPQ at 695-96.

veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are." Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. "There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher' was recognized, and clearly rejected, by the Supreme Court" in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. "In the German application, Ziegler disclosed only

that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was 'plastic-like.'" Id. at 1203, 26 USPQ2d at 1605. "Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility." Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. Id. "[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there." Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for the compound in question." Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by "marshal[ling] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility." Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at

1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be "useful" is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every "use" that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk, 376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best ... on the way to discovering a practical utility for polypropylene at the time of the filing," but not yet there. Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

With these principles in mind we turn to the issues at hand. Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal; i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We will focus on these asserted utilities first.

a. Polymorphisms

This utility is discussed at pages 38-45 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification, however, is not specific to the nucleotide molecules depicted in any of the SEQ ID NOs recited in claim 1. To the contrary, according to the specification, "one or more of the [6167] EST nucleic acid molecules (or a sub-fragment thereof) may be employed as a marker nucleic acid molecule to identify . . . polymorphism(s)." Page 35, lines 25-26. The specification does not explain why any of the 6167 nucleic acid molecules disclosed in the specification, or more specifically the nine nucleotide molecules depicted in SEQ ID NOs 78, 93, 340, 1965, 1985, 1991, 1993, 4047, and 5683, would in fact be useful in detecting polymorphisms.

Rather, Appellants argue that "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." Appeal Brief, page 8. In other words, Appellants' position is that an EST by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by an EST, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage. As the examiner explains,

[a] "polymorphism" is a collective concept defined by at least two variants (or alleles) found within members of a species collectively. Thus, one detects the presence of a polymorphism by analyzing multiple members of the species, i.e. analyzing a population. . . . The specification fails to disclose a specific and substantial utility for the claimed invention in the capacity of detecting polymorphisms, because it does not disclose whether the claimed nucleic acid molecules can, in fact, be used to detect any polymorphism whatsoever. . . .

The specification generally teaches using the claimed polynucleotides to identify a polymorphism, but fails to teach that a polymorphism could in fact be detected, or a specific polymorphism that could be detected. The specification generally teaches using a polymorphism, detectable with the claimed nucleic acid molecules, as a molecular marker for a linked trait of interest, but fails to teach either the polymorphism or the trait of interest.

Examiner's Answer, pages 11-12. In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the EST is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the gene

and its role in the plant's development and/or phenotype lies the line that defines "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.

b. Probes or source of primers

Appellants argue that the "specification discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms." Appeal Brief, page 8. That may be true, but it does not show the patentable utility of the claimed nucleic acids, because the nucleic acids isolated from other plants have no apparent, substantial use. Again, the present specification does not attribute any property in terms of plant trait or phenotype to any of the nucleic acid molecules set forth in the SEQ ID NOs recited in claim 1. In the absence of such information, nucleic acids from other plants that hybridize to the claimed nucleic acids themselves lack substantial utility. Thus, the use of the claimed nucleic acids to isolate such nucleic acids does not represent a substantial utility.

Appellants also assert that the claimed nucleic acid molecules may be used in a "chromosome walk." Appeal Brief, pages 9-10. According to Appellants,

[t]he claimed nucleic acid molecules provide a particularly appropriate and demonstrably useful starting point for a walk to isolate a promoter that is active in ovary tissues at early and late stages of development. Isolation of such a promoter would be desirable and particularly useful because it allows expression of proteins at important developmental states, including proteins that provide increased reproductive ability. Because the claimed nucleic acid molecules were isolated from ovary tissue, they provide an appropriate starting point for isolating a promoter active in ovary tissue. A random nucleic acid molecule does not provide an equally good starting point to isolate such a promoter.

Id., page 10. As we understand it, Appellants' argument is that the claimed ESTs may be useful in searching for promoters that are only active in ovary tissue. The specification, however, fails to demonstrate that any of the nucleic acid molecules set forth in the SEQ ID NOs recited in claim 1 would be useful in obtaining a successful result from such a search. The specification states that

[t]he [6167] nucleic acid molecules of the present invention may be used to isolate promoters of tissue enhanced[,] tissue specific, cell-specific, cell-type, developmentally or environmentally regulated expression profiles. Isolation and functional analysis of the 5' flanking promoter sequences of these genes from genomic libraries, for example, using genomic screening methods and PCR techniques would result in the isolation of useful promoters and transcriptional regulatory elements.

The specification does not provide any expectation of successfully using any of the 6167 nucleic acid molecules disclosed in the specification, or more specifically the nine nucleic acid molecules depicted in the SEQ ID NOs of claim 1, to isolate promoters of tissue-enhanced, tissue-specific, cell-specific, cell-type, developmentally or environmentally regulated expression profiles.

Furthermore, notwithstanding Appellants' assertion (Brief, page 10), there is no evidence on this record that any of the nucleic acid molecules recited in claim 1 are expressed in a tissue- or cell-type specific manner, or are developmentally or environmentally regulated. In this regard, we note that the claimed nucleic acid molecules were isolated from the cDNA libraries LIB3102 and LIB3103. Specification, pages 84-85. There is no evidence on this record that either of these libraries is a subtractive cDNA library, wherein nucleic acid molecules from other lily tissue, or from other developmental stages, was subtracted (removed) from the library. Thus, the cDNAs in the libraries LIB3102 and LIB3103 would be expected to include genes that

are expressed in a variety of lily tissues (e.g., genes involved in basic cell metabolism, synthesis of amino acids and other cellular components, and genes encoding ubiquitous structural proteins).

In our opinion, the claimed nucleic acid molecules having the sequences identified as SEQ ID NOs 78, 93, 340, 1965, 1985, 1991, 1993, 4047, and 5683, represent nine randomly selected nucleic acid molecules isolated from lily ovary tissue. Despite Appellants' assertion to the contrary, there is no reasonable expectation that any of the claimed nucleic acid molecules would be capable of isolating a promoter that was only active in ovary tissue. As Appellants recognize (Brief, page 10), "[a] random nucleic acid molecule does not provide an equally good starting point to isolate such a promoter" compared to a nucleic acid molecule that is known to be specifically associated with this stage of plant development.

It is true, as Appellants argue, that "[a]n invention may be 'less effective than existing devices but nevertheless meet the statutory criteria for patentability.'" Appeal Brief, page 10. However, with Appellants' claimed invention, there is no evidence or expectation that the claimed nucleic acid molecules would be "effective" at all. An invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form. See Brenner, 383 U.S. at 534, 148 USPQ at 695.

Appellants argue that the claimed nucleotide sequences are no less useful just because other nucleic acids can also be used to isolate promoters. See the Appeal Brief, page 9: "[T]he Examiner suggests that the asserted utilities are legally insufficient

simply because other molecules can be used for the same purpose. This position is wrong as a matter of law – there is no requirement of exclusive utility in the patent law.”

This argument is not persuasive. Appellants have never been asked to identify a utility that is unique, i.e., not shared by any other compounds or compositions. Rather, Appellants have been required to identify a utility that is specific to the invention claimed, as opposed to one that would apply regardless of the specific properties of the claimed invention. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695 (An invention does not have utility sufficient to satisfy § 101 until it is “refined and developed” to the point of providing a specific benefit in currently available form.).

An invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful as analgesics.

On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

Here, Appellants argue that asserted “chromosome walking” utility would support patentability even if the claimed nucleic acid molecules were less useful for this purpose

than a totally random nucleotide sequence. Appeal Brief, page 10 (“[E]ven if a random nucleic acid provided a better starting point than the claimed nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules.”). Clearly, the asserted utility is not based on the specific properties of the claimed nucleic acid molecules.

c. Other arguments

Appellants argue that the specification “discloses additional utilities for the claimed nucleic acid molecules including introduction of the claimed nucleic acid molecules into a plant or plant cell (either as sense or antisense inhibitors), which can then be used to screen for compounds such as a herbicide.” Appeal Brief, page 6. Specifically, Appellants argue (id.) that “a compound can be provided to both an antisense plant and a control plant (no antisense) and the effect of the compound on the plant can be monitored.” Appellants analogize this proposed procedure to a “cell-based assay” which, they assert, has a “legally sufficient utility.” Id.

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. The portion of the specification cited in support of this argument (pages 75-78) indicates that the nucleic acid molecule must be introduced into a plant cell and transcribed using an appropriate promoter to result in the suppression of an endogenous protein. The specification does not indicate that such a method is feasible when the nucleic acid to be used is uncharacterized as here. Such a use does not provide a specific or substantial benefit in currently available form.

Appellants also argue that the claimed nucleic acids are useful to measure the level of mRNA in a sample through use of microarray technology and use as molecular

markers. Appeal Brief, page 6. In regard to microarrays, Appellants argue (*id.*, n.2) that it is "standard practice" to screen populations of nucleic acids with EST sequences without characterizing each and every target mRNA. We find that this asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form. We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid depicted in, e.g., SEQ ID NO:78. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification provides no guidance regarding what the SEQ ID NO:78-specific information derived from a gene expression experiment would mean. As the examiner points out, "further experimentation is required to identify a 'real world use.' . . . A positive result to such a screen requires further experimentation to determine what, if anything, such a change means." Examiner's Answer, page 9.

To highlight the examiner's assertion, suppose, for example, that a researcher found that SEQ ID NO:78 expression was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be able to determine whether that result is meaningful. Maybe the meaning in a change in SEQ ID NO:78 expression would depend on other factors, but again the specification provides no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), or the degree of increase? The specification provides

The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form. Providing a single data point among thousands, even if the thousands of data points collectively are useful, does not meet this standard.

We also conclude that § 101's utility requirement is not satisfied by Appellants' assertion that the claimed nucleic acid molecules are useful as molecular markers or probes. Again, using one of the claimed nucleic acids as a molecular marker or probe to hybridize to part of a lily chromosome merely generates a single, uncharacterized data point that is useful only when combined with thousands of other data points. For the reasons discussed above in regard to gene expression assays, such uses do not represent "substantial" utility, as required by Brenner.

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Appeal Brief, page 12. Since Appellants fail to provide any suggestion of which use of ESTs this industry is premised on, we can only assume that Appellants are referring to the potential usefulness of EST databases, clone sets, or microarrays. The claims on appeal, however, are not directed to EST databases, clone sets, or microarrays, but to individual, uncharacterized ESTs. Again, we do not agree that the one data point which

may be provided by using the uncharacterized nucleic acid molecules of claim 1 in such devices represents a substantial use.

In addition, it is reasonable to expect that the rule Appellants proffer – that ESTs are individually patentable because they are useful in gene expression assays – would hurt, rather than help, what they characterize as a “multi-million dollar industry in the United States premised on the usefulness of ESTs.” Under Appellants’ standard, any EST from most (if not all) organisms would be held to have patentable utility based on its use in generating gene expression data.² The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating all of the DNA sequences on the microarray to ensure that they were not the subject of someone else’s patent.

For each of the DNAs that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each new product that an aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a “tragedy of the anticommons”:³

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex

² We can take judicial notice of the fact that organisms are of interest for many different reasons, such that gene expression assays could conceivably be used in their research. Humans, of course, are of interest in medical research. Other organisms are of interest to researchers because they have been historically well-studied (e.g., yeast, Arabidopsis, Drosophila), or because they are used as animal models for testing pharmaceuticals (e.g., mice, chimpanzees, rabbits), or because they are commercially valuable (e.g., pigs, corn, tomatoes), or because they are pests (e.g., Fusarium, ragweed, corn borers, zebra mussels), or because they are pathogens (e.g., Candida, various bacteria, tapeworms).

³ Heller et al., “Can patents deter innovation? The anticommons in biomedical research,” Science, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859). . . . To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

The basic guid pro quo of the patent system requires disclosure of an invention having substantial utility. Appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101. We therefore affirm the rejection of claim 1 under 35 U.S.C. § 101.

Claim 2 falls with claim 1. See the Appeal Brief, page 3.

3. Enablement

The examiner rejected claims 1 and 2 under 35 U.S.C. § 112, first paragraph, on the basis that "since the claimed invention is not supported by either a credible, specific, and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." Examiner's Answer, page 5. This rejection is simply a corollary of the finding of lack of utility.

Appellants argue that "[t]his rejection has been overcome by the arguments stated above regarding utility." Appeal Brief, page 14. We do not agree that Appellants' arguments overcome the rejection for lack of utility. Thus, our conclusion with respect to the § 101 issue also applies to the nonenablement rejection. On this basis we affirm the rejection of claim 1 under the enablement provision of 35 U.S.C. § 112, first paragraph.

4. Written description

The examiner rejected claims 1 and 2 under 35 U.S.C. § 112, first paragraph, for lack of adequate written description, reasoning that

[c]laim 1 is directed to a nucleic acid molecule "that encodes a plant protein or fragment thereof comprising." The specification fails to describe any open reading frames, start/stop codons, or encoded proteins for any SEQ ID NO. As such, these nucleic acid molecules are not described. At best, the SEQ ID NOS. may include a sequence encoding a fragment but not a full length protein.

The use of the term "comprising" is interpreted to encompass full length proteins and gene sequences that have not been disclosed. The common structural features of these encoded plant proteins or fragments are not disclosed and thus the claimed subject matter cannot be considered as being described.

The specification describes only the particular SEQ ID NOS. and no longer sequences containing them. One can only envision the particular sequence disclosed and cannot envision any encoded protein sequence or larger sequences in which the claimed SEQ ID NOS. are embedded.

Examiner's Answer, pages 5-6.

As we understand it, the examiner's rejection has two bases. First, the claimed nucleic acids are not adequately described because the preamble of claim 1 states that the each of the nucleic acids "encodes a plant protein or fragment thereof," and the specification does not describe any encoded proteins.

We will not sustain the rejection on this basis. The claims are directed to nucleic acids, not proteins, and the specification describes the complete sequence of each of the SEQ ID NOs that define the scope of the claimed nucleic acids. In addition, as we have construed the claims, the phrase that the examiner objects to ("encodes a plant protein or fragment thereof") has no patentable weight because it merely recites an inherent property that is expected for the claimed nucleic acids, based on the method by which they were isolated.

The second basis of the rejection, as we understand it, is that because of the transitional phrase "comprising", the claims encompass a large genus of nucleic acid molecules which are not adequately described by the SEQ ID NOs recited in the claim. See the Examiner's Answer, pages 18-20. Apparently, the examiner is of the opinion that the claimed invention should be limited to the nucleic acid molecules set forth in the recited SEQ ID NOs.

In response, Appellants argue that "[t]he fact that the claims at issue are intended to cover molecules that include the recited sequences joined with additional sequences does not mean that Applicants were any less in possession of the claimed nucleic acid molecules." Appeal Brief, page 16.

We have interpreted the claims to allow for the addition of nucleotides or other molecules at either end of the nucleotide sequences set forth in the recited SEQ ID NOs, but not to allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequences of the recited SEQ ID NOs. See pages 4-5, supra. We agree with Appellants that the claims, so interpreted, are supported by an adequate written description in the specification. The fact that the claimed nucleic acid molecules may

have other molecules attached to either or both of their 5' or 3' ends does not diminish Appellants' adequate written description of the nucleic acids molecules with the sequences set forth in the recited SEQ ID NOs, as claimed.

Accordingly, we reverse the rejection of claims 1 and 2 for lack of adequate written description.

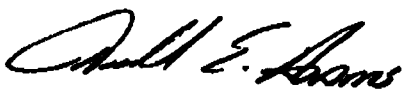
Summary

Although we reverse the examiner's rejection for lack of adequate written description, we affirm the rejection of claims 1 and 2 for lack of patentable utility.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


WILLIAM F. SMITH
Administrative Patent Judge


DONALD E. ADAMS
Administrative Patent Judge


ERIC GRIMES
Administrative Patent Judge

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) BOARD OF PATENT
) APPEALS AND
) INTERFERENCES
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Appeal No. 2003-1:
Application No. 09/540,232

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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 25

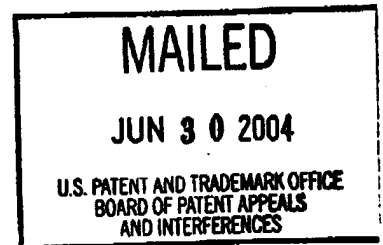
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte JOSEPH R. BYRUM,
GREGORY R. HECK, and THOMAS J. LA ROSA

Appeal No. 2003-1504
Application No. 09/440,687

ON BRIEF¹



Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent Judges.

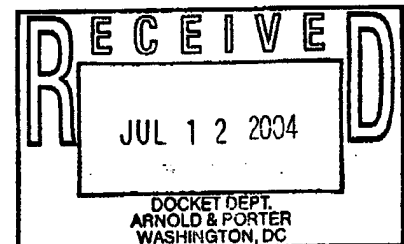
ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 and 8-19. Claim 1 is illustrative of the subject matter on appeal and is reproduced below.

1. A substantially purified nucleic acid molecule that encodes a soybean protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10.

The examiner does not rely on a reference.



¹ Appellants waived their request for oral hearing. Paper No. 24. Accordingly, we considered this appeal on Brief.

GROUND OF REJECTION

Claims 1 and 8-19 stand rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility.

Claims 1 and 8-18 stand rejected under 35 U.S.C. § 112, first paragraph, as the specification that fails to adequately describe the claimed invention.

We affirm the utility rejections under 35 U.S.C. § 101 and § 112, first paragraph and reverse the written description rejection under 35 U.S.C. § 112, first paragraph.

BACKGROUND

The subject matter of the present appeal is directed to expressed sequence tags. "Expressed sequence tags, or ESTs, are short sequences of randomly selected clones from a cDNA (or complementary DNA) library which are representative of the cDNA inserts of these randomly selected clones." Specification, page 1.

According to appellants (id.), "[t]he invention relates to nucleic acid molecules that encode proteins and fragments of proteins produced in plant cells, in particular, soybean plants." More particularly, appellants disclose "[t]he present invention provides a substantially purified nucleic acid molecule that encodes a soybean protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 31[,]015." Specification, page 9.

Of the 31,015 sequences disclosed in appellants' specification, the original claims filed with the application were directed to nucleic acid molecules that comprise a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 1 – 4,486. On May 25, 2000 (Paper No. 4), the examiner entered a Restriction requirement into the record, requiring, inter alia, appellants to elect up to 10 independent and distinct nucleotide sequences. Paper No. 4, bridging paragraph, pages 2-3. In response, appellants elected SEQ ID NOs: 1-10². Paper No. 5, page 2.

CLAIM CONSTRUCTION

As set forth above, claim 1 on appeal is drawn to a substantially purified nucleic acid molecule that encodes a soybean protein or fragment thereof comprising nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10. According to appellants' specification (bridging paragraph, pages 16-17), the term "substantially purified" refers

to a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

² Appellants disclose (specification, page 87), SEQ ID NO: 1 through SEQ ID NO: 4486 were obtained from the cDNA library LIB3040 which was "generated from soybean cultivar Asgrow 3244...."

As we understand the subject matter of claim 1, the transitional term "comprising" does not allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequences set forth in SEQ ID NOs: 1-10, but instead only allows for the addition of nucleotides or other molecules³ at either end of the nucleotide sequences.

In this regard, we recognize, as does the examiner (Answer, page 7), "[t]he claims encompass the nucleic acid for the gene (including introns and other non-coding information)...." For example, as explained by appellants (Brief, page 14),

[t]he present application describes more than just the nucleotide sequence required by the claims (SEQ ID NOs: 1 through 10), for example, it describes vectors comprising the claimed nucleic acid molecules ... [and] the addition of extra nucleotides or detectable labels to the disclosed nucleotide sequences.

The preamble of claim 1 also recites that the claimed nucleic acid molecule "encodes a soybean protein or fragment thereof." This phrase, however, merely recites an inherent function expected for the nucleic acid molecule defined by the SEQ ID NOs set forth in the claim; since the recited sequences were isolated as ESTs from soybean tissue, they would be expected to encode (parts of) soybean proteins. Since the introductory phrase does not further limit the invention defined by the body of the claim, it is irrelevant to construction of the claim. See IMS Technology, Inc. v. Haas Automation, Inc., 206 F.3d 1422, 1434, 54 USPQ2d 1129, 1137 (Fed. Cir. 2000) ("If the preamble

³ According to appellants' specification (page 17), "agents of the present invention may be labeled with reagents that facilitate detection of the agent (e.g., fluorescent labels, ... chemical labels, ... [and] modified bases...."

adds no limitations to those in the body of the claim, the preamble is not itself a claim limitation and is irrelevant to proper construction of the claim.").

Accordingly, for the purposes of our review, we interpret the claimed invention as drawn to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, that comprises a nucleotide sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10, with or without any preceding or trailing nucleotides, or other molecules.

DISCUSSION

Utility

The starting point for determining whether the nucleic acid molecule of claim 1⁴ possesses utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). As set forth in Brenner, at 534-35, 148 USPQ at 695⁵,

the basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until [an invention] is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

⁴ According to appellants (Brief, page 3), "[p]atentability of claims 1 and 8-19 is addressed together..." We interpret this statement to mean that claims 1 and 8-19 stand or fall together. Accordingly, we limit our discussion to representative independent claim 1. Claims 8-19 will stand or fall together with claim 1. In re Young, 927 F.2d 588, 590, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991).

⁵ In discussing the issue of utility under 35 U.S.C. § 101, the Federal Circuit and the Court of Customs and Patent Appeals since Brenner, have used the phrases "substantial utility" and "practical utility" interchangeably. See e.g., Fujikawa v. Wattanasin, 93 F.3d 1559, 1563-64, 39 USPQ2d 1895, 1898-1899 (Fed. Cir. 1996) ("It is well established that a patent may not be granted to an invention unless substantial or practical utility for the invention has been discovered and disclosed.").

In considering the issues presented in this appeal, special attention must be paid to the Brenner court's statement that a patent should issue only when an invention possesses "substantial utility," i.e., "where a specific benefit exists in currently available form." Whether a claimed invention is useful under 35 U.S.C. § 101 is a question of fact. Cross v. Iizuka, 753 F.2d 1040, 1044 n.7, 224 USPQ 739, 742 n.7 (Fed. Cir. 1985).

At issue in Brenner was a claim to "a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced." Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that "where a claimed process produces a known product it is not necessary to show utility for the product." Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be "useful," that "simple, everyday word can be pregnant with ambiguity when applied to the facts of life." Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the "new and useful" phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man's grasp and where little or nothing is wholly beyond the pale of "utility"—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.⁶

The Court, finding “no specific assistance in the legislative materials underlying § 101,” based its analysis on “the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the other.” Id. at 532, 148 USPQ at 695. The Court concluded that “[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.” Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant’s argument that attenuating the requirement of utility “would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge.” The Court noted that, while there is value to encouraging disclosure, “a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation:—It may engross a vast,

⁶ The invention at issue in Brenner was a process, but the Court expressly noted that its holding “would apply equally to the patenting of the product produced by the process.” Id. at 535, 148

unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help

their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are." Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. "There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher' was recognized, and clearly rejected, by the Supreme Court" in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. "In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was 'plastic-like.'" Id. at 1203, 26 USPQ2d at 1605. "Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility." Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a

rejection based on an intervening reference. Id. "[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there."
Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention

has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for the compound in question." Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by "marshal[ing] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility." Id. On the facts of that case -- successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds -- the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be "useful" is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every "use" that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk,

376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best ... on the way to discovering a practical utility for polypropylene at the time of the filing," but not yet there. Ziegler, at 1203, 26 USPQ2d at 1605.

On this record, appellants assert (Brief, bridging paragraph, pages 5-6, footnotes omitted) that the specification sets forth a number of utilities for the claimed nucleic acid molecule

e.g., to detect the presence and/or identity of polymorphisms, and as hybridization probes for expression profiling ... [in addition to introducing] the claimed nucleic acid molecules into a plant or plant cell (as antisense inhibitors), which can then be used to screen for compounds such as a herbicide ... to measure the level of mRNA in a sample, and use as molecular markers.

We note, however, that the specification does not specifically disclose how to use a nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10, as set forth in claim 1. To the contrary, the specification describes the aforementioned utilities as applicable to all of the nucleic acid molecules set forth in SEQ ID NO: 1 through SEQ ID NO: 31,015. See e.g., specification, pages 9-15. We note, however, that appellants discuss the potential activity of populations of nucleic acid molecules that includes less than all 31,015 nucleic acid sequences. See specification, pages 32-35. This section describes the cDNA libraries from which specific populations of nucleotide sequences were obtained. As discussed supra, SEQ ID NO: 1 through SEQ ID NO: 4,486 were obtained from the cDNA

library LIB3040. Specification, page 87. According to appellants' specification (bridging paragraph, pages 32-33),

[t]he ESTs of ... [the LIB3040] library can enable acquisition of, but are not limited to, genes involved in seed development, therefore, the ESTs of the present invention will also find great use in the isolation of a variety of agronomically significant genes, including but not limited to genes that regulate proteins, amino acids, sterols, oils, minerals, isoflavones, saponins, trypsin inhibitors, vitamins, tocopherols, antinutrient components, carbohydrates, starch metabolism, and seed regulatory elements. Such genes are associated with plant growth, quality, yield, and could also serve as links in important metabolic, developmental and catabolic pathways.

Appellants, however, fail to disclose which of the aforementioned activities, if any, can be attributed to a nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10.

Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal, i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We shall focus on these asserted utilities first and then address the other arguments set forth in the briefing.

a. Polymorphisms

This utility is discussed at pages 40-47 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification, however, is not specific to the nucleotide molecule set forth in claim 1. To the contrary, according to appellants' specification (e.g., page 46, lines 15-16), "one or more of the [31,015] nucleic acids of the present invention, may be utilized as markers or probes to detect polymorphisms...."

The specification does not explain why any of the 31,015 nucleic acid molecules disclosed in the specification, or more specifically a nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 10 would in fact be useful in detecting polymorphisms. Rather, appellants argue (Brief, page 7), "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." In other words, appellants' position is that a nucleic acid by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. See e.g., Brief, page 10. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by a nucleic acid, as here, detection of the presence or absence of a

polymorphism provides the barest information in regard to genetic heritage. As the examiner explains (Answer, page 12), appellants' specification defines "polymorphism" as

"a variation or difference in the sequence of the gene or its flanking regions that arises in some members of a species." It follows from this definition that if there is no "variation or difference in the sequence of the gene or its flanking regions" among "members of a species," then no polymorphism exists, i.e. a polymorphism is absent, in this region of the genome.

According to the examiner (Answer, page 11), "the presence or absence of any of the claimed nucleotide sequences in a sample (or polymorphisms thereof) has no meaning absent some association. Further experimentation is required to determine what, if any, that meaning or association might be." In this regard, the examiner finds (Answer, page 12), appellants' specification "does not disclose whether the claimed nucleic acid molecules can, if fact, be used to detect any polymorphism whatsoever. Thus, the specification leaves open the possibility that there may be no polymorphism to detect." According to the examiner (Answer, bridging paragraph, pages 12-13), "[t]he specification generally teaches using a polymorphism, detectable with the claimed nucleic acid molecules, as a molecular marker for a linked trait of interest, but fails to teach either the polymorphism or the trait of interest." According to the examiner (Answer, page 14), "the specification fails to identify even one specific polymorphism that can be detected with the claimed nucleic acid molecule, the specification fails to show any specific correspondence between the disclosed general utility and the claimed subject matter, regardless of any specific application requiring detection of polymorphisms." Accordingly the examiner finds (id.), "using the claimed

invention to first determine whether or not the claimed nucleic acid molecule can, in fact, detect a polymorphism is to determine whether or not the claimed invention has a utility that requires detecting a polymorphism, i.e. it is 'use testing' and not substantial."

In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the nucleic acid is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the gene and its role in the plant's development and/or phenotype lies the line between "utility" and "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.⁷

b. Probes or source of primers

Appellants assert that the "specification discloses that the claimed nucleic acid molecules can be used ... to isolate nucleic acid molecules of other plants and organisms...." Brief, page 8. While that may be true, it begs the question of what substantial use such nucleic acid molecules would have? Again, the present specification does not attribute any property in terms of plant trait, or

⁷ For the foregoing reasons, we disagree with appellants' assertion (Brief, page 3) that the claimed nucleic acid molecule provides "at least one specific benefit to the public, for example the ability to identify the presence or absence of a polymorphism."

phenotype to the nucleic acid molecule set forth in claim 1. In the absence of such information, using the claimed molecule to isolate other molecules, which themselves lack substantial utility, does not represent a substantial utility.⁸

Appellants also assert that the claimed nucleic acid molecule may be used in a "chromosome walk." Brief, page 8. According to appellants (Brief, page 9),

The claimed nucleic acid molecules provide a particularly appropriate and demonstrably useful starting point for a walk to isolate a promoter that is active in soybean. ... A random nucleic acid molecule does not provide an equally good starting point to isolate such a promoter. Furthermore, even if a random nucleic acid molecule provided a better starting point than the claimed nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules.

As we understand this argument, the claimed nucleic acid may be useful in searching for promoters that are active in soybeans. The specification, however, fails to demonstrate that a nucleic acid molecule as set forth in claim 1 would be useful in obtaining a successful result from such a search. As set forth at page 38, lines 15-20 of appellants' specification,

The [31,015] nucleic acid molecules of the present invention may be used to isolate promoters of tissue enhanced, tissue specific, cell-specific, cell -type, developmentally or environmentally regulated expression profiles. Isolation and functional analysis of the 5' flanking promoter sequences of these genes from genomic libraries, for example, using genomic screening methods and PCR techniques would result in the isolation of useful promoters and transcriptional regulatory elements.

⁸ In addition, we note the examiner's assertion (Answer, page 16), "[a]t the time the application had been filed, future experimentation on the part of one skilled in the art would have been required to determine which, if any, other plant species contained nucleic acid molecules that could have been obtained using the claimed invention, and under what experimental conditions."

The specification does not provide any expectation of successfully using any of the 31,015 nucleic acid molecules disclosed in the specification, or more specifically the nucleic acid molecule of claim 1 to isolate promoters of tissue enhanced, tissue specific, cell-specific, cell-type, developmentally or environmentally regulated expression profiles. According to the examiner (Answer, page 16), "the specification fails to disclose any characteristics of the corresponding promoter, or any other promoter within 'chromosome walking' distance; neither structural characteristics, by which the promoter might be identified, nor functional characteristics, by which a specific and substantial use for the promoter might be determined." By way of example, the examiner argues (Answer, page 17), assume

a nucleotide sequence is identified during the chromosome walk as a putative promoter by sequence analysis, is then subcloned into operable linkage with a reporter gene and transfected into an appropriate cell, but found not to express the reporter gene in the cells. This result could mean the putative promoter: is not truly a promoter, i.e. a false positive; is not the corresponding promoter; or is incomplete, i.e. lacked additional sequence elements required for promoter activity in the seed pod cells.

According to the examiner (Answer, page 11), appellants merely isolated the claimed nucleic acid molecule, "[t]hey have not tested, evaluated, or calibrated the claimed nucleotide sequence for any particular use."

We recognize appellants' argument (Brief, page 9), "[a]n invention may be 'less effective than existing devices but nevertheless meet the statutory criteria for patentability.' Custom Accessories, Inc. v. Jeffrey-Allan Indus., 807 F.2d 955, 960 n.12, 1 U.S.P.Q.2d 1196, 1199 n.12 (Fed. Cir. 1986)." While we agree with appellants' statement, we fail to see how it applies to appellants' claimed

invention, wherein there is no evidence or expectation that the claimed nucleic acid molecules would be "effective" at all. In this regard, we remind appellants that an invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695.

An invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful as analgesics. On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention; it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

c. Other Arguments

Appellants argue that the specification "discloses additional utilities for the claimed nucleic acid molecules including introduction of the claimed nucleic acid molecules into a plant or plant cell (either as sense or antisense inhibitors), which can then be used to screen for compounds such as a herbicide." Brief,

page 5. Specifically, appellants argue (id.) that "a compound can be provided to both an antisense plant and a control plant (no antisense) and the effect of the compound on the plant can be monitored." Appellants analogize this proposed procedure to a "cell-based assay" which appellants assert to have a "legally sufficient utility." Id.

However, the examiner finds (Answer, page 9), further research is required to use the claimed nucleic acid molecules "to detect the presence and/or identity of polymorphisms, as hybridization probes for expression profiling, as antisense inhibitors by introduction of the claimed nucleic acid molecule into a plant or plant cell where the resulting cell or plant is to be used to screen compounds such as herbicides, to measure the level of mRNA in a sample, and as a molecular marker." In addition, the examiner finds (id.), that since targets are not disclosed in the specification, the use of the claimed nucleic acid molecule "as antisense inhibitors would require further experimentation to determine the target of inhibition." To the extent that appellants would argue that the claimed nucleic acid could be used in assays that measure the presence of a material that correlates to a predisposed disease condition, the examiner finds (Answer, page 7), "[t]he instant specification sets forth no such correlation for any condition."

As to the use of the claimed nucleic acid in microarrays (see e.g., Brief, page 6, n. 4), the examiner finds (Answer, page 10), "[a]ppellant is [sic] not claiming microarrays or collections of nucleotides and the specification does not

associate the claimed sequence with any trait of interest." According to the examiner (Answer, page 10),

[c]ontrary to appellant's [sic] assertions, further experimentation is required to identify a "real world use." A negative result to such a screen tells what the nucleic acid is not and cannot be used for. A positive result to such a screen requires further experimentation to determine what, if anything, such a change means. It is not an immediate benefit except in the sense to indicate that further research might yield a "real world use."

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. In regard to microarrays, we find that the asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form. We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid molecule set forth in claim 1. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification simply provides no guidance regarding what the specific information derived from a gene expression experiment would mean in the context of a nucleic acid molecule as set forth in claim 1.

To highlight the examiner's assertion (Answer, page 10), suppose, for example, that a researcher found that expression of the nucleic acid molecule set forth in claim 1 was increased when a cell was treated with a particular agent.

The specification provides no basis on which a skilled worker would be able to

determine whether that result is meaningful. Maybe the meaning in a change in expression would depend on other factors, but again the specification provides no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), the degree of increase? The specification simply provides no guidance as to how to interpret the results that might be seen using the nucleic acid molecule of claim 1 in a gene expression assay.

In effect, appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at

695. Here, appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility because the specification did not disclose how to use the end-product, the products claimed here lack utility, because even if used in gene expression assays, the specification does not disclose how to use the specific gene expression data in the context of the nucleic acid molecule of claim 1.

Assuming arguendo, that a generic gene expression assay - one based on monitoring expression of thousands of uncharacterized nucleic acids - would provide a useful tool for, e.g., drug discovery, it does not follow that each one of the nucleic acids represented in the assay individually has patentable utility. Although each nucleic acid in the assay contributes to the data generated by the assay overall, the contribution of a single nucleic acid - its data point - is only a tiny contribution to the overall picture. The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form. Providing a single data point among thousands or millions, even if the thousands or millions of data points collectively are useful, does not meet this standard. The Supreme Court noted that the patent system contemplates a basic quid pro quo: in exchange for the legal right to exclude others from his invention for a period of time, an inventor discloses his invention to the public. See Brenner, 383 U.S. at 534, 148 USPQ at 695. The Brenner Court held that the grant of patent rights to an applicant is justified only by disclosure of an invention with substantial utility - a specific benefit in currently available form. Until the invention has been refined and developed to this point, the Court held, the

applicant has not met his side of the bargain, and has not provided a disclosure sufficient to justify a grant of the right to exclude others. See id.

We reach the same conclusion in regard to appellants' assertion that the nucleic acid molecule set forth in claim 1 is useful as a molecular marker or probe. It is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 1 as a molecular marker or probe represents a substantial use.

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Brief, page 10. Since appellants fail to provide any suggestion on which use of ESTs this industry is premised on, we can only assume that appellants are referring to the potential usefulness of EST databases, clone sets or microarrays. Suffice it to say, the claims on appeal are not directed to EST databases, clone sets and/or microarrays. Again, it is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 1 in such devices represents a substantial use.

Further, we understand appellants' position to be that a compound would be patentable if it was adequately described in the specification and was not disclosed or suggested in the prior art. This standard, however, is not the one set by Congress, which requires that a patentable invention also be useful and fully enabled, nor is it the standard that has been consistently applied by the courts.

Not only is appellants' proposed utility standard contrary to controlling case law, but there are reasons to expect that it would hurt – rather than help – the microarray industry. Under appellants' standard, any naturally occurring gene, and fragments thereof, would be held to have patentable utility based on its use in generating expression data. The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating the patent status of each oligonucleotide on the microarray. Not only that, but since appellants assert that their reasoning supports the utility of gene fragments, all of the subsequences of each of the genes would have to be checked to ensure that they were not the subject of someone else's patent.

For each of the genes (or fragments thereof) that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each new product that an aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a "tragedy of the anticommons".⁹

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the

⁹ Heller et al., "Can patents deter innovation? The anticommons in biomedical research," *Science*, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859).... To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

We note that the examiner acknowledges appellants' assertion (Brief, page 5, n. 2), "[i]t is irrelevant whether the corresponding mRNA or polypeptide have utility because [a]pplicants are not relying on utility of the mRNA or polypeptide to establish utility of the claimed nucleic acid molecules." Answer, page 8. Nevertheless, the examiner asserts (Answer, bridging sentence, pages 8-9), "[t]he [B]rief does not dispute that no open reading frame (ORF), no encoded protein, nor any biological activity for any encoded protein has been disclosed for SEQ ID NOS: 1-10."

As for non-asserted utilities, the examiner finds (Answer, page 6), "there is no evidence of a well-established utility for the disclosed ESTs or claimed nucleic acid molecules."

The basic guid pro quo of the patent system requires disclosure of an invention having substantial utility. On reflection, we find appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101. For the foregoing reasons we affirm the rejection of claim 1 under 35 U.S.C. § 101. As discussed supra, claims 8-19 fall together with claim 1.

Enablement

According to the examiner (Answer, page 6), "since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." This rejection is simply a corollary of the finding of lack of utility. Appellants assert (Brief, page 12), "[t]his rejection was erroneous and has been overcome by the arguments stated above regarding ... [the rejection under 35 U.S.C. § 101]." Thus, our conclusion with respect to the § 101 issue will also apply to this aspect of the § 112 (enablement) issue. On this basis we affirm the rejection of claim 1 under the enablement provision of 35 U.S.C. § 112, first paragraph. As discussed supra, claims 8-19 fall together with claim 1.

Written description

The examiner rejected claims 1 and 8-18 under 35 U.S.C. § 112, first paragraph, for lack of an adequate written description. According to the examiner (Answer, page 7),

[t]he claims encompass the nucleic acid for the gene (including introns and other non-coding information) within the scope of the invention by virtue of the "comprising" and "encoding" language." ... Neither the structural and functional properties of any gene comprising SEQ ID NOS: 1-10 nor the structural and functional properties of any protein or fragment thereof encoded by a nucleotide sequence comprising SEQ ID NOS: 1-10 are disclosed in the specification.

As we understand it, the examiner's rejection has two bases. First, the claimed nucleic acids are not adequately described because the preamble of claim 1 states that the claimed nucleic acid molecule "encodes a soybean protein or fragment thereof," and the specification does not describe any encoded proteins.

We will not sustain the rejection on this basis. The claims are directed to nucleic acid molecules, not proteins, and the specification describes the complete sequence of each of the SEQ ID NOS that define the scope of the claimed nucleic acid molecules. In addition, as we have construed the claims, the phrase that the examiner objects to ("encodes a soybean protein or fragment thereof") has no patentable weight because it merely recites an inherent property that is expected for the claimed nucleic acids, based on the method by which they were isolated.

The second basis of the rejection, as we understand it, is that because of the transitional phrase "comprising", the claims encompass a large genus of

nucleic acid molecules, which are not adequately described by the SEQ ID NOs recited in the claim. See Answer, pages 19-22. Apparently, the examiner is of the opinion that the claimed invention should be limited to the nucleic acid molecules set forth in the recited SEQ ID NOs.

We have interpreted the claims to allow for the addition of nucleotides or other molecules at either end of the nucleotide sequences set forth in the recited SEQ ID NOs, but not to allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequences of the recited SEQ ID NOs. See pages 3-5, supra. The fact that the claimed nucleic acid molecules may have other molecules attached to either or both of their 5' or 3' ends does not diminish Appellants' adequate written description of the nucleic acids molecules with the sequences set forth in the recited SEQ ID NOs, as claimed.

Accordingly, we reverse the rejection of claims 1 and 8-18 for lack of adequate written description.

Summary


We affirm the utility rejections under 35 U.S.C. § 101 and § 112, first paragraph.

We reverse the written description rejection under 35 U.S.C. § 112, first paragraph.

No time period for taking any subsequent action in connection with this
appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


William F. Smith
Administrative Patent Judge


Donald E. Adams
Administrative Patent Judge


Eric Grimes
Administrative Patent Judge

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) BOARD OF PATENT
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) APPEALS AND
) INTERFERENCES
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)
)

Appeal No. 2003-1504
Application No. 09/440,687

Lawrence M. Lavin, Jr.
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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte MARK S. ABAD and THOMAS J. LA ROSA

Appeal No. 2003-1135
Application No. 09/565,240

ON BRIEF¹

MAILED

JUN 30 2004

U.S. PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent Judges.

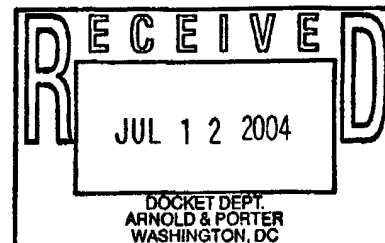
ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's final rejection of claim 1, which is reproduced below.

1. A substantially purified nucleic acid molecule that encodes a soybean protein or soybean protein fragment comprising the nucleic acid sequence of SEQ ID NO: 49441.

The examiner does not rely on a reference.



¹ Appellants waived their request for oral hearing. Paper No. 24. Accordingly, we considered this appeal on Brief.

GROUND OF REJECTION

Claim 1 stands rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility. We affirm.

BACKGROUND

According to appellants' specification (page 1), "[t]he invention relates to nucleic acid molecules that encode proteins and fragments of proteins produced in plant cells, in particular, soybean plants." More particularly, appellants disclose "[t]he present invention provides a substantially purified nucleic acid molecule that encodes a soybean protein or fragment thereof comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 54[,],005." Specification, page 9.

Of the 54,005 sequences disclosed in appellants' specification, the original claims filed with the application were directed to nucleic acid molecules that comprise a nucleic acid sequence selected from the group consisting of SEQ ID Nos: 49,441 – 54,005. On February 9, 2001 (Paper No. 2), the examiner entered a Restriction requirement into the record, requiring, inter alia, appellants to elect a single nucleic acid sequence for consideration on the merits. Paper No. 2, page 2. In response, appellants elected SEQ ID NO: 49,441². Paper No. 5, page 2.

² Appellants disclose (specification, page 98, as amended in Paper No. 11, pages 8-9), SEQ ID NO: 49,441 was obtained from the cDNA library LIB3167.

CLAIM CONSTRUCTION

As set forth above, claim 1 on appeal is drawn to a substantially purified nucleic acid molecule that encodes a soybean protein or soybean protein fragment comprising the nucleic acid sequence set forth in SEQ ID NO: 49,441. According to appellants' specification (page 17), the term "substantially purified"

refers to a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

As we understand the subject matter of claim 1 the transitional term "comprising" does not allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequences set forth in SEQ ID NO: 49,441, but instead only allows for the addition of nucleotides or other molecules³ at either end of the nucleotide sequence set forth in SEQ ID NO: 49,441. In this regard, we recognize, as does the examiner (Answer, page 4), the claim as written encompasses, inter alia, any full length gene, fusion construct, RNA or cDNA that comprises the nucleotide sequence set forth in SEQ ID NO: 49,441 and is capable of encoding at least a fragment of a soybean protein.

³ According to appellants' specification (page 17), "agents of the present invention may be labeled with reagents that facilitate detection of the agent (e.g., fluorescent labels, ... chemical labels, ... [and] modified bases...."

Accordingly, for the purposes of our review, we interpret the claimed invention as drawn to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, that comprises the nucleotide sequence set forth in SEQ ID NO: 49,441 with or without any preceding or trailing nucleotides, or other molecules.

DISCUSSION

Utility

The starting point for determining whether the nucleic acid molecule of claim 1 possesses utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). As set forth in Brenner, at 534-35, 148 USPQ at 695⁴,

the basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until [an invention] is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

In considering the issues presented in this appeal, special attention must be paid to the Brenner court's statement that a patent should issue only when an invention possesses "substantial utility," i.e., "where a specific benefit exists in currently available form." Whether a claimed invention is useful under 35 U.S.C.

⁴ In discussing the issue of utility under 35 U.S.C. § 101, the Federal Circuit and the Court of Customs and Patent Appeals since Brenner, have used the phrases "substantial utility" and "practical utility" interchangeably. See e.g., Fujikawa v. Wattanasin, 93 F.3d 1559, 1563-64, 39 USPQ2d 1895, 1898-1899 (Fed. Cir. 1996) ("It is well established that a patent may not be granted to an invention unless substantial or practical utility for the invention has been discovered and disclosed.").

§ 101 is a question of fact. Cross v. Iizuka, 753 F.2d 1040, 1044 n.7, 224 USPQ 739, 742 n.7 (Fed. Cir. 1985).

At issue in Brenner was a claim to "a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced." Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that "where a claimed process produces a known product it is not necessary to show utility for the product." Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be "useful," that "simple, everyday word can be pregnant with ambiguity when applied to the facts of life." Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the "new and useful" phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man's grasp and where little or nothing is wholly beyond the pale of "utility"—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.⁵

⁵ The invention at issue in Brenner was a process, but the Court expressly noted that its holding "would apply equally to the patenting of the product produced by the process." Id. at 535, 148 USPQ at 695-96.

The Court, finding "no specific assistance in the legislative materials underlying § 101," based its analysis on "the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the other." Id. at 532, 148 USPQ at 695. The Court concluded that "[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant's argument that attenuating the requirement of utility "would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge." The Court noted that, while there is value to encouraging disclosure, "a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the

first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are.” Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. “There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of ‘useful in research’ or ‘useful as building blocks of value to the researcher’ was recognized, and clearly rejected, by the Supreme Court” in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. “In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was ‘plastic-like.’” Id. at 1203, 26 USPQ2d at 1605. “Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility.” Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. Id. “[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of

the German application; but in that application Ziegler had not yet gotten there."

Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no

insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for the compound in question." Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by "marshall[ing] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility." Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be "useful" is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every "use" that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk,

376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best ... on the way to discovering a practical utility for polypropylene at the time of the filing," but not yet there. Ziegler, at 1203, 26 USPQ2d at 1605.

On this record, appellants assert (Brief, bridging paragraph, pages 5-6) that specification sets forth a number of utilities for the

present invention, including "probes for assisting in the isolation of full-length cDNAs or genes which would be used to make protein and optionally further usage to make the corresponding antibodies, gene mapping, isolation of homologous sequences, detection of gene expression such as in Northern blot analysis, molecular weight markers, chromosomal markers, and for numerous other generic genetic engineering usages." ... In addition to ... detecting the presence and level of mRNA in a sample; identifying polymorphisms; obtaining promoters and other flanking genetic elements to such molecules; determining the location of a corresponding DNA sequence on a genetic map; isolating related nucleic acid and protein molecules; and conducting plant transformation or transfection; etc....

We note, however, that the specification does not specifically disclose how to use a nucleic acid molecule comprising the nucleic acid sequence set forth in SEQ ID NO: 49,441, as set forth in claim 1. To the contrary, the specification describes the aforementioned utilities as applicable to all of the nucleic acid molecules set forth in SEQ ID NO: 1 through SEQ ID NO: 54,005. See e.g., specification, pages 9-15. We note, however, that appellants discuss the potential activity of (specification, pages 33-39) populations of nucleic acid molecules that includes less than all 54,005 nucleic acid sequences. This section describes the cDNA libraries from which specific populations of

nucleotide sequences were obtained. As discussed supra, SEQ ID NO: 49,441 through SEQ ID NO: 54,005 were obtained from the cDNA library LIB3167.

Specification, page 98, as amended in Paper No. 11, pages 8-9. According to appellants' specification (bridging paragraph, pages 38-39),

the [LIB3167] cDNA library of the present invention can enable acquisition of, including but not limited to, stress response genes and genes that regulate PR proteins ... the ESTs of the present invention will also find great use in the isolation of a variety of agronomically significant genes, including but not limited to genes that regulate germination, developmental stress, protein, amino acids, sterols, oils, minerals, isoflavones, saponins, trypsin inhibitors, vitamins, tocopherols, antinutrient components, carbohydrates, starch metabolism, and seedling and vegetative regulatory elements. Such genes are associated with plant growth, quality, yield, and could also serve as links in important metabolic, developmental and catabolic pathways.

Appellants, however, fail to disclose which of the aforementioned activities, if any, can be attributed to the nucleic acid molecule comprising the sequence set forth in SEQ ID NO: 49,441, or a protein or protein fragment encoded thereby.

Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal, i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We shall focus on these asserted utilities first and then address the other arguments set forth in the briefing.

a. Polymorphisms

This utility is discussed at pages 43-55 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification, however,

is not specific to the nucleotide molecule set forth in claim 1. To the contrary, according to appellants' specification (e.g., page 50, lines 7-9), "one or more of the [54,005] nucleic acids of the present invention, may be utilized as markers or probes to detect polymorphisms...."

The specification does not explain why any of the 54,005 nucleic acid molecules disclosed in the specification, or more specifically a nucleic acid molecule comprising the nucleic acid sequence set forth in SEQ ID NO: 49,441 would in fact be useful in detecting polymorphisms. Rather, appellants argue (Brief, page 7), "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." In other words, appellants' position is that a nucleic acid by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. See e.g., Brief, page 10. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by the nucleic acid, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage. As the examiner explains (Answer, page 7),

While agreement is reached in that some polymorphisms have been found to be useful as a result of their presence having been correlated with another event, e.g., the development of cancer in an individual, the over or under expression of one or more genes that has in turn a specific effect that has known value. In the

present case, however, the claimed nucleic acid sequence has not been tightly associated with any one protein. Indeed, the appellant is less than [sic] assured that the claimed nucleic acid encodes an intact protein or a fragment of a soybean protein....

Stated differently, whether the claimed nucleotide sequence is capable of detecting the presence or absence of a polymorphism has no meaning absent some association.

In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the nucleic acid is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the gene and its role in the plant's development and/or phenotype lies the line between "utility" and "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.⁶

b. Probes or source of primers

Appellants assert that the "specification discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms...." Brief, page 7. While that may be true, it begs the question of what substantial use such nucleic acid molecules would have? Again, the present specification does not attribute any property in terms of plant trait, or

⁶ For the foregoing reasons, we disagree with appellants' assertion (Brief, page 3) that the claimed nucleic acid molecule provides "at least one specific benefit to the public, e.g., the ability to identify the presence or absence of a polymorphism in a population of soybean plants."

phenotype to any of the nucleic acid molecule set forth in claim 1. In the absence of such information, using the claimed molecule to isolate other molecules, which themselves lack substantial utility, does not represent a substantial utility.

Appellants also assert that the claimed nucleic acid molecules may be used in a "chromosome walk" or to isolate "the promoter of the gene corresponding to the claimed nucleic acid molecules." Brief, page 8. As we understand this argument, the claimed nucleic acid may be useful in searching for promoters. The specification, however, fails to demonstrate that the nucleic acid molecule set forth in claim 1 would be useful in obtaining a successful result from such a search. As set forth in appellants' specification (bridging paragraph, pages 41-42),

The [54,005] nucleic acid molecules of the present invention may be used to isolate promoters of tissue enhanced, tissue specific, cell-specific, cell -type, developmentally or environmentally regulated expression profiles. Isolation and functional analysis of the 5' flanking promoter sequences of these genes from genomic libraries, for example, using genomic screening methods and PCR techniques would result in the isolation of useful promoters and transcriptional regulatory elements.

The specification, however, does not provide any expectation of successfully using any of the 54,005 nucleic acid molecules disclosed in the specification, or more specifically the nucleic acid molecule of claim 1 to isolate promoters having cell enhanced, cell specific, tissue enhanced, tissue specific, developmentally or environmentally regulated expression profiles.

We agree with appellants' assertion (Brief, page 8) that an invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful as analgesics. On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101. In this regard, we note the examiner's argument (Answer, page 8), "a review of the disclosure fails to find where any specific chromosome as being a target for initiating chromosome walking or for otherwise marking a specific region of interest of a given chromosome. Accordingly, the utility asserted is considered to be 'general' and not 'specific'."

c. Other Arguments

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Brief, page 11. Since appellants fail to provide any suggestion on which use of ESTs this industry is premised on, we can only

assume that appellants are referring to the potential usefulness of EST databases, clone sets or microarrays. Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. In regard to microarrays, we find that the use of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form. We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid molecule set forth in claim 1. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification simply provides no guidance regarding what the specific information derived from a gene expression experiment would mean in the context of a nucleic acid molecule as set forth in claim 1.

Suppose, for example, that a researcher found that expression of the nucleic acid molecule set forth in claim 1 was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be able to determine whether that result is meaningful. Maybe the meaning in a change in expression would depend on other factors, but again the specification provides no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), the degree of

increase? The specification simply provides no guidance as to how to interpret the results that might be seen using the nucleic acid molecule of claim 1 in a gene expression assay.

In effect, appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at 695. Here, appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility because the specification did not disclose how to use the end-product, the products claimed here lack utility, because even if used in gene expression assays, the specification does not disclose how to use the specific gene expression data in the context of the nucleic acid molecule of claim 1.

Assuming arguendo, that a generic gene expression assay - one based on monitoring expression of thousands of uncharacterized nucleic acids - would provide a useful tool for, e.g., drug discovery, it does not follow that each one of the nucleic acids represented in the assay individually has patentable utility.

Although each nucleic acid in the assay contributes to the data generated by the

assay overall, the contribution of a single nucleic acid—its data point—is only a tiny contribution to the overall picture. The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form.

Providing a single data point among thousands or millions, even if the thousands or millions of data points collectively are useful, does not meet this standard.

The Supreme Court noted that the patent system contemplates a basic quid pro quo: in exchange for the legal right to exclude others from his invention for a period of time, an inventor discloses his invention to the public. See Brenner, 383 U.S. at 534, 148 USPQ at 695. The Brenner Court held that the grant of patent rights to an applicant is justified only by disclosure of an invention with substantial utility – a specific benefit in currently available form. Until the invention has been refined and developed to this point, the Court held, the applicant has not met his side of the bargain, and has not provided a disclosure sufficient to justify a grant of the right to exclude others. See id.

We reach the same conclusion in regard to appellants' assertion that the nucleic acid molecules set forth in claim 1 are useful as a molecular marker or probe. It is not seen that the one data point that may be provided by using the

uncharacterized nucleic acid molecule of claim 1 as a molecular marker or probe represents a substantial use.

Further, we understand appellants' position to be that a compound would be patentable if it was adequately described in the specification and was not disclosed or suggested in the prior art. This standard, however, is not the one set by Congress, which requires that a patentable invention also be useful and fully enabled, nor is it the standard that has been consistently applied by the courts.

Not only is appellants' proposed utility standard contrary to controlling case law, but there are reasons to expect that it would hurt – rather than help – the microarray industry. Under appellants' standard, any naturally occurring gene or polypeptide, and fragments thereof, would be held to have patentable utility based on its use in generating expression data. The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating the patent status of each oligonucleotide on the microarray. Not only that, but since appellants assert that their reasoning supports the utility of gene and polypeptide fragments, all of the subsequences of each of the genes or polypeptides would have to be checked to ensure that it was not the subject of someone else's patent.

For each of the genes or polypeptides (or fragments thereof) that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each new product that an

aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a "tragedy of the anticommons":⁷

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859).... To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

The basic guid pro quo of the patent system requires disclosure of an invention having substantial utility. Appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101.

⁷ Heller et al., "Can patents deter innovation? The anticommons in biomedical research," Science, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

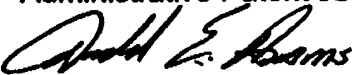
For the foregoing reasons we affirm the rejection of claim 1 under 35
U.S.C. § 101.

Enablement

According to the examiner (Answer, pages 5-6), "since the claimed invention is not supported by either a specific asserted utility or a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." This rejection is simply a corollary of the finding of lack of utility. Appellants assert (Brief, bridging paragraph, pages 11-12), this rejection should be reversed for the same reasons set forth in their arguments regarding the rejection under 35 U.S.C. § 101. Thus, our conclusion with respect to the § 101 issue will also apply to this aspect of the § 112 (enablement) issue. On this basis we affirm the rejection of claim 1 under the enablement provision of 35 U.S.C. § 112, first paragraph.

AFFIRMED


William F. Smith
Administrative Patent Judge


Donald E. Adams
Administrative Patent Judge


Eric Grimes
Administrative Patent Judge

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) BOARD OF PATENT
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) APPEALS AND
) INTERFERENCES
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Appeal No. 2003-1135
Application No. 09/565,240

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The opinion in support of the decision being entered today was not written
for publication and is not binding precedent of the Board.

15746-B

Paper No. 21

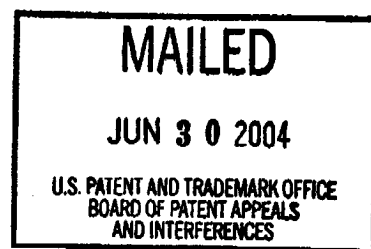
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte RAGHUNATH V. LALGUDI,
PHILIP W. MILLER and KEITH O'CONNELL

Appeal No. 2003-0996
Application No. 09/540,215

ON BRIEF¹



Before WILLIAM F. SMITH, ADAMS, and GRIMES, Administrative Patent
Judges.

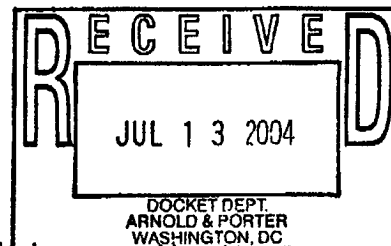
ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the
examiner's final rejection of claims 1, 2 and 4-7. Claim 1 is illustrative of the
subject matter on appeal and is reproduced below:

1. A substantially purified nucleic acid molecule that encodes an algal
protein or fragment thereof comprising the nucleic acid sequence of
SEQ ID NO: 1.

The examiner does not rely on a reference.



¹ Appellants waived their request for oral hearing. Paper No. 20. Accordingly, we considered this
appeal on Brief.

GROUND OF REJECTION

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility.

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. § 112, first paragraph, as the specification that fails to adequately describe the claimed invention.

We affirm the utility rejections under 35 U.S.C. § 101 and § 112, first paragraph and reverse the written description rejection under 35 U.S.C. § 112, first paragraph.

BACKGROUND

The subject matter of the present appeal is directed to expressed sequence tags. "Expressed sequence tags, or ESTs, are short sequences of randomly selected clones from a cDNA (or complementary DNA) library which are representative of the cDNA inserts of these randomly selected clones." Specification, page 3.

According to appellants' specification (page 1), "[t]he present invention relates to nucleic acid sequences from the unicellular green algae, Chlorella vulgaris.⁽²⁾" More particularly, appellants disclose "[t]he present invention provides a substantially purified nucleic acid molecule having a nucleic acid

² We note that while claim 2 on appeal is limited to a nucleic acid molecule that comprises SEQ ID NO: 1 and encodes a Chlorella vulgaris protein or fragment thereof, claim 1 on appeal is much broader in scope and encompasses a nucleic acid sequence that encodes any "algal protein or fragment" and comprises the sequence set forth in SEQ ID NO: 1.

sequence selected from the group consisting of SEQ ID NO: 1 through SEQ ID NO: 3,519." Specification, page 12.

The original claims filed with the application were directed to nucleic acid molecules that comprise a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 1 – 3,519. On July 3, 2001 (Paper No. 5), the examiner entered a Restriction requirement into the record. According to the examiner (id. at page 3), "[e]xamination will be restricted to only the elected sequences. For the instant application, the nucleic acid sequences are considered to be complex and thus, election of a single SEQ ID Number is required." In response, appellants elected SEQ ID NO: 1. Paper No. 7, page 2.

CLAIM CONSTRUCTION

As set forth above, claim 1 on appeal is drawn to a substantially purified nucleic acid molecule that encodes an algal protein or fragment thereof comprising the nucleic acid sequence of SEQ ID NO: 1. According to appellants' specification (page 14), the term "substantially purified" refers

to a molecule separated from substantially all other molecules normally associated with it in its native state. More preferably a substantially purified molecule is the predominant species present in a preparation. A substantially purified molecule may be greater than 60% free, preferably 75% free, more preferably 90% free, and most preferably 95% free from the other molecules (exclusive of solvent) present in the natural mixture. The term "substantially purified" is not intended to encompass molecules present in their native state.

As we understand the subject matter of claim 1 the transitional term "comprising" does not allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequence set forth in SEQ ID NO: 1, but instead only allows for the

addition of nucleotides or other molecules³ at either end of the nucleotide sequence.

The preamble of claim 1 also recites that the claimed nucleic acid molecule "encodes an algal protein or fragment thereof." This phrase, however, merely recites an inherent function expected for the nucleotide sequence of the recited SEQ ID NO; since the recited sequence was isolated as an EST from Chlorella vulgaris C-265⁴, it would be expected to encode (part of) an algal protein. Since the introductory phrase does not further limit the invention defined by the body of the claim, it is irrelevant to construction of the claim. See IMS Technology, Inc. v. Haas Automation, Inc., 206 F.3d 1422, 1434, 54 USPQ2d 1129, 1137 (Fed. Cir. 2000) ("If the preamble adds no limitations to those in the body of the claim, the preamble is not itself a claim limitation and is irrelevant to proper construction of the claim.").

Accordingly, for the purposes of our review, we interpret the claimed invention as drawn to a nucleic acid molecule, separated from substantially all other molecules normally associated with it in its native state, that comprises a nucleotide sequence of SEQ ID NO: 1, with or without any preceding or trailing nucleotides, or other molecules.

³ According to appellants' specification (page 15), "agents of the present invention may be labeled with reagents that facilitate detection of the agent (e.g., fluorescent labels, ... chemical labels, ... [and] modified bases...."

⁴ As set forth on page 109 of the specification "[t]he cDNA library LIB191 is prepared from the cultures of the eukaryotic green microalgae Chlorella vulgaris C-265." At page 110 of the specification, appellants disclose that "[t]he ESTs of the present invention are generated by sequencing initiated from the 5' end of each cDNA clone."

DISCUSSION

Utility

The starting point for determining whether the nucleic acid molecule of claim 1⁵ possesses utility under 35 U.S.C. § 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). As set forth in Brenner, at 534-35, 148 USPQ at 695⁶,

the basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until [an invention] is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

In considering the issues presented in this appeal, special attention must be paid to the Brenner court's statement that a patent should issue only when an invention possesses "substantial utility," i.e., "where a specific benefit exists in currently available form." Whether a claimed invention is useful under 35 U.S.C. § 101 is a question of fact. Cross v. Iizuka, 753 F.2d 1040, 1044 n.7, 224 USPQ 739, 742 n.7 (Fed. Cir. 1985).

⁵ According to appellants (Brief, page 3), "[t]he patentability of claims 1, 2 and 4-7 is addressed in Sections 8.A through 8.D...." We interpret this statement to mean that claims 1, 2 and 4-7 stand or fall together. Accordingly, we limit our discussion to representative independent claim 1. Claims 2 and 4-7 will stand or fall together with claim 1. In re Young, 927 F.2d 588, 590, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991).

⁶ In discussing the issue of utility under 35 U.S.C. § 101, the Federal Circuit and the Court of Customs and Patent Appeals since Brenner, have used the phrases "substantial utility" and "practical utility" interchangeably. See e.g., Fujikawa v. Wattanasin, 93 F.3d 1559, 1563-64, 39 USPQ2d 1895, 1898-1899 (Fed. Cir. 1996) ("It is well established that a patent may not be granted to an invention unless substantial or practical utility for the invention has been discovered and disclosed.").

At issue in Brenner was a claim to "a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced." Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that "where a claimed process produces a known product it is not necessary to show utility for the product." Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be "useful," that "simple, everyday word can be pregnant with ambiguity when applied to the facts of life." Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the "new and useful" phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man's grasp and where little or nothing is wholly beyond the pale of "utility"—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.⁷

The Court, finding "no specific assistance in the legislative materials underlying § 101," based its analysis on "the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the

⁷ The invention at issue in Brenner was a process, but the Court expressly noted that its holding "would apply equally to the patenting of the product produced by the process." Id. at 535, 148 USPQ at 695-96.

other." Id. at 532, 148 USPQ at 695. The Court concluded that "[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.

The Court considered and rejected the applicant's argument that attenuating the requirement of utility "would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge." The Court noted that, while there is value to encouraging disclosure, "a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that

what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d 936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are." Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. "There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher' was recognized, and clearly rejected, by the Supreme Court" in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. "In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was 'plastic-like.'" Id. at 1203, 26 USPQ2d at 1605. "Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility." Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. Id. "[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there." Id.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for

the compound in question.” Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by “marshal[ing] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds ..., analogous to the benefit provided by the showing of an in vivo utility.” Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be “useful” is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every “use”

that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is “substantial”, i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner’s standard has been interpreted to mean that “vague, general disclosures or arguments of ‘useful in research’ or ‘useful as building blocks of value to the researcher’” would not satisfy § 101. See Kirk, 376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a “plastic-like” polypropylene capable of being pressed into a flexible film was held to show that the applicant was “at best ... on the way to discovering a

practical utility for polypropylene at the time of the filing," but not yet there.

Ziegler, at 1203, 26 USPQ2d at 1605.

On this record, appellants assert (Brief, bridging paragraph, pages 5-6, footnotes omitted),

The instant specification describes multiple utilities for the present invention, including as probes in an array, to screen for polymorphisms, for gene mapping, and expressing protein for generating antibodies, etc. ... [in addition to] determining the [e]xpression [r]esponse of a green algae as a function of the mRNA levels expressed by the cells ... to identify polymorphisms, in addition to their use as molecular markers.

We note, however, that the specification does not specifically disclose how to use a nucleic acid molecule comprising the nucleic acid sequence of SEQ ID NO: 1. To the contrary, the specification describes the aforementioned utilities as applicable to all of the nucleic acid molecules set forth in SEQ ID NO: 1 through SEQ ID NO: 3,519. See e.g., specification, pages 12-13. Stated differently, the specification fails to disclose, with any degree of specificity, the utility of a nucleic acid molecule as claimed.

Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal, i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We shall focus on these asserted utilities first and then address the other arguments set forth in the briefing.

a. Polymorphisms

This utility is discussed at pages 93-101 of the specification in terms of what polymorphisms are and how one would go about determining the existence

of a polymorphism. The discussion in this portion of the specification, however, is not specific to the nucleotide molecule set forth in claim 1. To the contrary, according to appellants' specification (e.g., page 94, lines 4-5), "one or more of the [3,519] EST nucleic acid molecules (or a sub-fragment thereof) may be employed as a marker nucleic acid molecule to identify ... polymorphism(s)."

The specification does not explain why any of the 3,519 nucleic acid molecules disclosed in the specification, or more specifically a nucleic acid molecule comprising the nucleic acid sequence of SEQ ID NO: 1 would in fact be useful in detecting polymorphisms. Rather, appellants argue (Brief, page 7), "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." In other words, appellants' position is that a nucleic acid by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. See e.g., Brief, page 10. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by a nucleic acid, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage. As the examiner explains (Answer, page 11), appellants' specification defines

"polymorphism" as

a "variation or difference in the sequence of the gene or its flanking regions that arises in some members of a species." (page 94). It follows from this definition that if there is no "variation or difference in the sequence of the gene or its flanking regions" among "members of a species," then no polymorphism exists, i.e. a polymorphism is absent, in this region of the genome.

According to the examiner (Answer, page 10), "the presence or absence of any of the claimed nucleotide sequences in a sample (or polymorphisms thereof) has no meaning absent some correlation to an immediate benefit." In this regard, the examiner finds (Answer, page 11), appellants' specification "does not disclose whether the claimed nucleic acid molecules can, in fact, be used to detect any polymorphism whatsoever. Thus, the specification leaves open the possibility that there may be no polymorphism to detect." According to the examiner (Answer, page 12),

[t]he specification generally teaches using the claimed polynucleotides to identify a polymorphism, but fails to teach that a polymorphism could in fact be detected, or a specific polymorphisms that could be detected. The specification generally teaches using a polymorphism, detectable with the claimed nucleic acid molecules, as a molecular marker for a linked trait of interest, but fails to teach either the polymorphism or the trait of interest.

According to the examiner (Answer, page 13), "the specification fails to identify even one specific polymorphism that can be detected with the claimed nucleic acid molecule, the specification fails to show any specific correspondence between the disclosed general utility and the claimed subject matter, regardless of any specific application requiring detection of polymorphisms." Accordingly the examiner finds (id.), "using the claimed invention to first determine whether or

not the claimed nucleic acid molecule can, in fact, detect a polymorphism is to determine whether or not the claimed invention has a utility that requires detecting a polymorphism, i.e. it is 'use testing' and not substantial."

In contrast, at the other end of the "utility spectrum" would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the nucleic acid is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge (the present circumstances) and having complete knowledge of the gene and its role in the plant's development and/or phenotype lies the line between "utility" and "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.⁶

b. Probes or source of primers

Appellants assert that the "specification discloses that the claimed nucleic acid molecules can be used ... to isolate nucleic acid molecules of other plants such as soybean, alfalfa, Arabidopsis, barley, maize, etc." Brief, page 8, footnote omitted. While that may be true, it begs the question of what substantial use such nucleic acid molecules would have? Again, the present specification does not attribute any property in terms of plant trait, or phenotype to the nucleic acid molecule set forth in claim 1. In the absence of such information, using the

⁶ For the foregoing reasons, we disagree with appellants' assertion (Brief, page 3) that the claimed nucleic acid molecule provides "at least one specific benefit to the public, for example the ability to identify the presence or absence of a polymorphism in a population of algae."

claimed molecule to isolate other molecules, which themselves lack substantial utility, does not represent a substantial utility.⁹

Appellants also assert that the claimed nucleic acid molecule may be used in a "chromosome walk." Brief, page 9. According to appellants (Brief, page 9),

The claimed nucleic acid molecules provide a particularly appropriate and demonstrably useful starting point for a walk to isolate a promoter that is active in green algae. ... Random nucleic acid molecules are not similarly suitable. ... Furthermore, even if a random nucleic acid molecule provided a better starting point than the claimed nucleic acid molecules, it would not obviate the utility of the claimed nucleic acid molecules.

As we understand this argument, the claimed nucleic acid may be useful in searching for promoters that are active in green algae. The specification, however, fails to demonstrate that a nucleic acid molecule as set forth in claim 1 would be useful in obtaining a successful result from such a search.

According to the examiner (Answer, page 15), "the specification fails to disclose any characteristics of the corresponding promoter, or any other promoter within 'chromosome walking' distance; neither structural characteristics, by which the promoter might be identified, nor functional characteristics, by which a specific and substantial use for the promoter might be determined." By way of example, the examiner argues (Answer, bridging paragraph, pages 16-

⁹ In addition, we note the examiner's assertion (Answer, page 15), "[a]t the time the application had been filed, future experimentation on the part of one skilled in the art would have been required to determine which, if any, other plant species contained nucleic acid molecules that could have been obtained using the claimed invention, and under what experimental conditions."

17), assume

a nucleotide sequence is identified during the chromosome walk as a putative promoter by sequence analysis, is then subcloned into operable linkage with a reporter gene and transfected into an appropriate cell, but found not to express the reporter gene in the cells. This result could mean the putative promoter: is not truly a promoter, i.e. a false positive; is not the corresponding promoter; or is incomplete, i.e. lacked additional sequence elements required for promoter activity in the seed pod cells.

According to the examiner (Answer, page 11), appellants merely isolated the claimed nucleic acid molecule, "[t]hey have not tested, evaluated, or calibrated the claimed nucleotide sequence for any particular use."

We recognize appellants' argument (Brief, page 9), "[a]n invention may be 'less effective than existing devices but nevertheless meet the statutory criteria for patentability.' Custom Accessories, Inc. v. Jeffrey-Allan Indus., 807 F.2d 955, 960 n.12, 1 U.S.P.Q.2d 1196, 1199 n.12 (Fed. Cir. 1986)." While we agree with appellants' statement, we fail to see how it applies to appellants' claimed invention, wherein there is no evidence or expectation that the claimed nucleic acid molecules would be "effective" at all. In this regard, we remind appellants that an invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695.

An invention certainly can have a utility that is shared by other compounds or compositions. Take, for example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful

as analgesics. On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

c. Other Arguments

Upon review of the record, we agree with the examiner that further experimentation would be required to use the claimed nucleic acid molecule "to detect the presence of and/or identify polymorphisms, as hybridization probes in an array for expression profiling, express proteins for generating antibodies, to screen for compounds to determine the effect of the compound on a population of green algae." Answer, bridging paragraph, pages 7-8.

As to the use of the claimed nucleic acid in microarrays (see e.g., Brief, page 6, n. 3), the examiner finds (Answer, bridging paragraph, pages 8-9), "[a]ppellants are not claiming microarrays or collections of nucleotides and the specification does not associate the claimed sequence with any trait of interest." According to the examiner (Answer, page 9),

[c]ontrary to [a]ppellants' assertions, further experimentation is required to identify a "real world use." For example, a negative hybridization result (which is already a further experimentation) to

such a screen tells what the nucleic acid is not and cannot be used for[;] and a positive result to such a screen requires even further experimentation to determine what, if anything, such a change means. Therefore, the claimed nucleic acid molecule does not provide an immediate benefit except providing a starting point for an artisan to further experiment in order to arrive at the point of immediate "real world" use.

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. In regard to microarrays, we find that the asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form. We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid molecule set forth in claim 1. However, the specification provides no guidance that would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification simply provides no guidance regarding what the specific information derived from a gene expression experiment would mean in the context of a nucleic acid molecule as set forth in claim 1.

To highlight the examiner's assertion (Answer, page 9), suppose, for example, that a researcher found that expression of the nucleic acid molecule set forth in claim 1 was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be able to determine whether that result is meaningful. Maybe the meaning in a change in expression would depend on other factors, but again the specification provides

no hint as to what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), the degree of increase? The specification simply provides no guidance as to how to interpret the results that might be seen using the nucleic acid molecule of claim 1 in a gene expression assay.

In effect, appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at 695. Here, appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility because the specification did not disclose how to use the end-product, the products claimed here lack utility, because even if used in gene expression assays, the specification does not disclose how to use the specific gene expression data in the context of the nucleic acid molecule of claim 1.

Assuming arguendo, that a generic gene expression assay - one based on monitoring expression of thousands of uncharacterized nucleic acids - would

provide a useful tool for, e.g., drug discovery, it does not follow that each one of the nucleic acids represented in the assay individually has patentable utility. Although each nucleic acid in the assay contributes to the data generated by the assay overall, the contribution of a single nucleic acid - its data point - is only a tiny contribution to the overall picture. The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently available form. Providing a single data point among thousands or millions, even if the thousands or millions of data points collectively are useful, does not meet this standard. The Supreme Court noted that the patent system contemplates a basic quid pro quo: in exchange for the legal right to exclude others from his invention for a period of time, an inventor discloses his invention to the public. See Brenner, 383 U.S. at 534, 148 USPQ at 695. The Brenner Court held that the grant of patent rights to an applicant is justified only by disclosure of an invention with substantial utility – a specific benefit in currently available form. Until the invention has been refined and developed to this point, the Court held, the applicant has not met his side of the bargain, and has not provided a disclosure sufficient to justify a grant of the right to exclude others. See id.

We reach the same conclusion in regard to appellants' assertion that the nucleic acid molecule set forth in claim 1 is useful as a molecular marker or probe. It is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 1 as a molecular marker or probe represents a substantial use.

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Brief, page 11. Since appellants fail to provide any suggestion on which use of ESTs this industry is premised on, we can only assume that appellants are referring to the potential usefulness of EST databases, clone sets or microarrays. Suffice it to say, the claims on appeal are not directed to EST databases, clone sets and/or microarrays. Again, it is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of claim 1 in such devices represents a substantial use.

Further, we understand appellants' position to be that a compound would be patentable if it was adequately described in the specification and was not disclosed or suggested in the prior art. This standard, however, is not the one set by Congress, which requires that a patentable invention also be useful and fully enabled, nor is it the standard that has been consistently applied by the courts.

Not only is appellants' proposed utility standard contrary to controlling case law, but there are reasons to expect that it would hurt – rather than help –

the microarray industry. Under appellants' standard, any naturally occurring gene, and fragments thereof, would be held to have patentable utility based on its use in generating expression data. The practical effect of this standard would be that making a microarray with, e.g., 1000 genes represented on it would require investigating the patent status of each oligonucleotide on the microarray. Not only that, but since appellants assert that their reasoning supports the utility of gene fragments, all of the subsequences of each of the genes would have to be checked to ensure that it was not the subject of someone else's patent.

For each of the genes (or fragments thereof) that was the subject of a patent claim held by someone else, a license would have to be negotiated – potentially thousands of such negotiations for the finished product. These transaction costs would have to be incurred for each new product that an aspiring microarray manufacturer wished to market. The industry gridlock likely to result from this scenario has been termed a “tragedy of the anticommons”:¹⁰

By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.

Heller, page 698.

¹⁰ Heller et al., “Can patents deter innovation? The anticommons in biomedical research,” Science, Vol. 280, pp. 698-701 (1998). Available online at www.sciencemag.org/cgi/content/full/280/5364/698.

The Supreme Court has warned against allowing too many tollbooths on the road to innovation:

Patents . . . are meant to encourage invention by rewarding the inventor with the right, limited to a term of years fixed by the patent, to exclude others from the use of his invention. . . . But in rewarding useful invention, the "rights and welfare of the community must be fairly dealt with and effectually guarded." Kendall v. Winsor, 21 How. 322, 329 (1859).... To begin with, a genuine "invention" or "discovery" must be demonstrated "lest in the constant demand for new appliances the heavy hand of tribute be laid on each slight technological advance in an art."

Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 230, 140 USPQ 524, 527 (1964).

We note that the examiner acknowledges appellants' assertion (Brief, page 6, n. 2), it "is irrelevant whether the corresponding mRNA or polypeptide have utility because [a]pplicants are not relying on utility of the mRNA or polypeptide to establish utility of the claimed nucleic acid molecules." Answer, page 7. Nevertheless, the examiner asserts (Answer, bridging sentence, pages 8-9), "[t]he [B]rief does not dispute that no open reading frame (ORF), no encoded protein, nor any biological activity for the encoded protein has been disclosed for SEQ ID Number 1."

The basic quid pro quo of the patent system requires disclosure of an invention having substantial utility. On reflection, we find appellants' disclosure in this case does not provide a specific benefit in currently available form, and therefore lacks the substantial utility required by 35 U.S.C. § 101.

For the foregoing reasons we affirm the rejection of claim 1 under 35 U.S.C. § 101. As discussed supra, claims 2 and 4-7 fall together with claim 1.

Enablement

According to the examiner (Answer, page 5), "since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." This rejection is simply a corollary of the finding of lack of utility. Appellants assert (Brief, page 12), "[t]he arguments stated above regarding ... [the rejection under 35 U.S.C. § 101]." Thus, our conclusion with respect to the § 101 issue will also apply to this aspect of the § 112 (enablement) issue. On this basis we affirm the rejection of claim 1 under the enablement provision of 35 U.S.C. § 112, first paragraph. As discussed supra, claims 2 and 4-7 fall together with claim 1.

Written description

The examiner rejected claims 1, 2 and 4-7 under 35 U.S.C. § 112, first paragraph, for lack of adequate written description, reasoning (Answer, pages 5-6) that

[c]laim 1 is directed to a nucleic acid molecule "that encodes an algal protein or fragment thereof comprising." The specification fails to describe any open reading frames, start/stop codons, or encoded proteins for SEQ ID Number 1. As such, these nucleic acid molecules are not described. At best, the SEQ ID Number may include a sequence encoding a fragment but not a full length protein.

The use of the term "comprising" is interpreted to encompass full length proteins and gene sequences that have not been disclosed or identified. The common structural features of these encoded plant proteins or fragments are not disclosed and thus the claimed subject matter cannot be considered as being described.

The specification describes only SEQ ID Number 1 and no longer sequences containing them. One can only envision the particular sequence disclosed and cannot envision any encoded protein sequence or larger sequences in which the claimed SEQ ID Number 1 is embedded.

As we understand it, the examiner's rejection has two bases. First, the claimed nucleic acids are not adequately described because the preamble of claim 1 states that the each of the nucleic acids "encodes an algal protein or fragment thereof," and the specification does not describe any encoded proteins.

We will not sustain the rejection on this basis. The claims are directed to nucleic acids, not proteins, and the specification describes the sequence of SEQ ID NO: 1, which defines the scope of the claimed nucleic acid molecule. In addition, as we have construed the claims, the phrase that the examiner objects to ("encodes an algal protein or fragment thereof") has no patentable weight because it merely recites an inherent property that is expected for the claimed nucleic acids, based on the method by which they were isolated.

The second basis of the rejection, as we understand it, is that because of the transitional phrase "comprising", the claims encompass a large genus of nucleic acid molecules, which are not adequately described by SEQ ID NO: 1 as recited in the claim. See the Examiner's Answer, pages 18-22. Apparently, the examiner is of the opinion that the claimed invention should be limited to SEQ ID NO: 1.

In response, Appellants argue that "[t]he fact that the claims at issue are intended to cover molecules that include the recited sequences joined with

additional sequences does not mean that [a]pplicants were any less in possession of the claimed nucleic acid molecules." Appeal Brief, page 16, footnote omitted.

We have interpreted the claims to allow for the addition of nucleotides or other molecules at either end of the nucleotide sequence set forth in SEQ ID NO: 1, but not to allow for internal alterations (e.g. insertions or deletions) of the nucleotide sequence. See pages 3-4, supra. We agree with appellants that the claims, so interpreted, are supported by an adequate written description in the specification. The fact that the claimed nucleic acid molecules may have other molecules attached to either or both of their 5' or 3' ends does not diminish appellants' adequate written description of a nucleic acids molecule with the sequence set forth in SEQ ID NO: 1, as claimed.

Accordingly, we reverse the rejection of claims 1, 2 and 4-7 for lack of adequate written description.

SUMMARY

We affirm the utility rejections under 35 U.S.C. § 101 and § 112, first paragraph.

We reverse the written description rejection under 35 U.S.C. § 112, first paragraph.

No time period for taking any subsequent action in connection with this
appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


William F. Smith
Administrative Patent Judge


Donald E. Adams
Administrative Patent Judge


Eric Grimes
Administrative Patent Judge

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Appeal No. 2003-0996
Application No. 09/540,215

Page 30

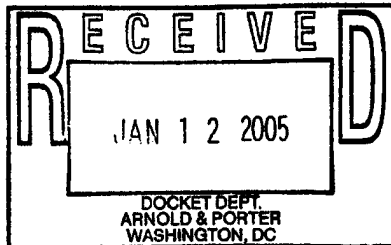
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The opinion support of the decision being entered today was not written
for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

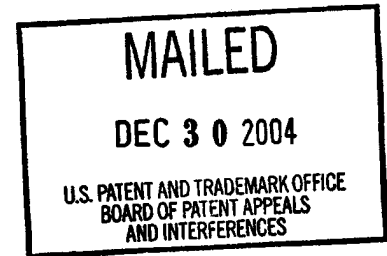
**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte JOSEPH R. BYRUM



Appeal No. 2004-1772
Application No. 09/552,087

ON BRIEF



Before WILLIAM F. SMITH, ADAMS, and GREEN, Administrative Patent Judges.

ADAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the
examiner's final rejection of claims 3, 5-7, 9, 10, and 12-20, which are all the
claims pending in the application.

Claims 3, 7 and 12 are illustrative of the subject matter on appeal and are
reproduced below:

3. A transformed plant cell having a nucleic acid molecule which
comprises:
 - (A) an exogenous promoter region which functions in said cell to
cause the production of a mRNA molecule, wherein said promoter
nucleic acid molecule comprises SEQ ID NO: 1 or a complement
thereof; which is linked to
 - (B) a structural nucleic acid molecule encoding a protein or
peptide; which is linked to

(C) a 3' non-translated sequence that functions in said cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of said mRNA molecule.

7. A transformed plant having a nucleic acid molecule which comprises:
 - (A) an exogenous promoter region which functions in a plant cell to cause the production of a mRNA molecule, wherein said promoter nucleic acid molecule comprises SEQ ID NO: 1, or a complement thereof; which is linked to
 - (B) a structural nucleic acid molecule encoding a protein or peptide; which is linked to
 - (C) a 3' non-translated sequence that functions in a plant cell to cause termination of transcription and addition of polyadenylated ribonucleotides to a 3' end of said mRNA molecule.
12. A substantially purified nucleic acid molecule, wherein said nucleic acid molecule comprises a nucleic acid sequence having between 100% and 70% identity with a nucleic acid sequence of SEQ ID NO: 1 or a complement thereof.

No prior art is relied upon in support of the examiner's position.

GROUND OF REJECTION

Claims 3, 5-7, 9-10 and 12-20 stand rejected under 35 U.S.C. § 101 as lacking utility and § 112, first paragraph, for lack of enablement based on the finding of lack of utility.

Claims 12-19 stand rejected under 35 U.S.C. § 112, first paragraph, as the specification fails to provide an adequate written description of the claimed invention.

We reverse the written description rejection, and remand the application to the examiner for further consideration of the utility and enablement rejections.

DISCUSSION

Written Description:

The examiner rejected the claims as inadequately described, on the basis that the claimed nucleic acids

comprise SEQ ID NO: 1 or a nucleic acid related to SEQ ID NO: 1 by a particular range of identity (i.e. 100% to 80% identity, as in claim 13)¹. This genus is sufficiently broad so as to encompass a multitude of variants of SEQ ID NO:1, as well as any full length coding sequence, mRNA, promoter, or genomic DNA of which SEQ ID NO: 1 is a portion, or of which the recited polynucleotides with identity to SEQ ID NO: 1 are portions. This large genus is represented in the specification by one species, a nucleic acid consisting of SEQ ID NO: 1.

Answer, bridging paragraph, pages 8-9 .

We will reverse this rejection. The written description requirement of 35 U.S.C. § 112, first paragraph, does not require a description of the complete structure of every species within a chemical genus. See Utter v. Hiraga, 845 F.2d 993, 998, 6 USPQ2d 1709, 1714 (Fed. Cir. 1988) ("A specification may, within the meaning of 35 U.S.C. § 112, ¶ 1, contain a written description of a broadly claimed invention without describing all species that claim encompasses.").

The Federal Circuit has held that "[a] description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to the members of the genus, which

¹ While the examiner refers to claim 13, which depends from claim 12, we note as illustrated above, that claim 12 is broader than claim 13, in that it relates to a "sequence having between 100% and 70% identity with a nucleic acid sequence of SEQ ID NO: 1 or a complement thereof."

features constitute a substantial portion of the genus." University of California v. Eli Lilly and Co., 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997).

Our appellate reviewing court has also held that the complete structure of a claimed DNA is not necessarily required. The court adopted the standard that "the written description requirement can be met by 'show[ing] that an invention is complete by disclosure of sufficiently detailed, relevant identifying characteristics . . . i.e., complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics.'" Enzo Biochem, Inc. v. Gen-Probe Inc., 296 F.3d 1316, 1324, 63 USPQ2d 1609, 1613 (Fed. Cir. 2002) (emphasis omitted, alterations in original).

With respect to the claimed sequences that have 70% to 100% identity with SEQ ID NO:1, the Lilly court held that a genus could be described via "recitation of structural features common to the members of the genus, which features constitute a substantial portion of the genus." Lilly, 119 F.3d at 1568, 43 USPQ2d at 1406. The Enzo court held that such a description could take the form of "complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics." 296 F.3d at 1324, 63 USPQ2d at 1613. In this case, the complete structure of SEQ ID NO:1 has been described, and the nucleic acids of the claimed genus share 70 or more percent identity with the structure of SEQ ID NO:1. Thus, the structural features that are common to the genus make up 70% of the structure

of the claimed polypeptides. The examiner has not adequately explained why this degree of structural similarity is inadequate to "constitute a substantial portion of the genus," as required by Lilly.

Accordingly, we reverse the rejection of claims 12-19 under 35 U.S.C. § 112, first paragraph, as the specification fails to provide an adequate written description of the claimed invention.

Utility:

The issues of whether a disclosure satisfies the "how to use" provision of 35 U.S.C. § 112, and the utility requirement of 35 U.S.C. § 101, are closely related. See In re Swartz, 232 F.3d 862, 863, 56 USPQ2d 1703 (Fed. Cir. 2000), Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1358, 52 USPQ2d 1029, 1034 (Fed. Cir. 1999), Newman v. Quigg, 877 F.2d 1575, 1581, 11 USPQ2d 1340, 1345 (Fed. Cir. 1989). Under the utility requirement, our appellate reviewing court, has held that it makes no sense to require claims to set forth inventions that satisfy all the disclosed objectives, but that "[w]hen a properly claimed invention meets at least one stated objective, utility under § 101 is clearly shown." Raytheon Co. v. Roper Corp., 724 F.2d 951, 958, 220 USPQ 592, 598 (Fed. Cir. 1983).

As set forth in In re Langer, 503 F.2d 1380, 183 USPQ 288 (CCPA 1974), emphasis in original:

As a matter of Patent Office practice, a specification which contains a disclosure of utility which corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of Section 101 for the entire claimed subject matter unless there is reason for one skilled in the art to question

the objective truth of the statement of utility or its scope. Assuming that sufficient reason to question the statement of utility and its scope does exist, a rejection for lack of utility under Section 101 will be proper on that basis; such a rejection can be overcome by suitable proofs indicating that the statement of utility and its scope as found in the specification are true. Cf. In re Marzocchi, 58 CCPA 1069, 1073, 439 F.2d 220, 223, 169 USPQ 367, 369 (1971) (involving the enablement requirement of 35 U.S.C. 112, first paragraph).

According to the examiner (Answer, page 6), "[t]here has been no specific assertion that in fact SEQ ID NO: 1 is a promoter, aside from the claims."

Contrary to the examiner's assertion, however, appellant's specification does set forth a statement of utility that corresponds in scope to the subject matter claimed. Specifically, appellant discloses (specification, page 16), "[a]nother class of agents of the present invention are nucleic acid molecules having promoter regions or partial promoter regions, including those located within SEQ ID NO: 1...." As set forth in Raytheon, "[w]hen a properly claimed invention meets at least one stated objective, utility under § 101 is clearly shown."

Similarly, as set forth in Johns Hopkins Univ. v. CellPro Inc., 152 F.3d 1342, 1361, 47 USPQ2d 1705, 1714 (Fed. Cir. 1998), "[t]he enablement requirement is met if the description enables any mode of making and using the invention."

Therefore, it is the examiner's initial burden to establish that those skilled in this art would question the objective truth of the asserted utility. See In re Brana, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 ("Only after the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence."). In our opinion, the examiner has not provided sufficient evidence to

show that one of ordinary skill in the art would reasonably doubt that a nucleic acid molecule comprising SEQ ID NO: 1 would not have utility as a promoter as disclosed in appellants' specification.

To the contrary, the examiner has simply asserted (Answer, page 5) that "further experimentation would be required to reasonably confirm that SEQ ID NO: 1, or its complement, or fragments of either would function as a promoter as required by the claims. The specification does not provide any guidance as to the use of SEQ ID NO: 1, its complement or fragments thereof as promoters." Based on this assertion, the examiner concludes, "[t]he use of ... SEQ ID NO: 1 as a promoter is not a specific or substantial utility since further experimentation would be required to confirm that in fact SEQ ID NO: 1 has the ability to cause the production of an mRNA molecule...." Answer, page 6. While appellant has disclosed the characteristics of promoters within the scope of the claimed invention at pages 16-17 of the specification, the examiner fails to address this section of appellant's specification, or to establish a factual basis on this record to support the assertion that SEQ ID NO: 1 does not contain a promoter element.

According to the examiner (id.), "one would have to determine if the ... [promoter] is tissue specific or constitutive, for example, or if it is an inducible promoter, and under what circumstances it is induced or repressed in order to make use of the claimed plants." The examiner finds (id.), "[e]ach of these determinations is highly unpredictable, from the determination ... of the type of promoter it may be to the determination of fragments of the promoter that confer

promotion activity." The examiner, however, fails to establish a factual basis on this record to support these assertions.

Further, our review of this record is hindered by the examiner's failure to apply any type of claim construction to the claims now before us on appeal. In this regard, we note that claims 3 and 7, as well as the claims that depend from these claims, require in part "(A)" of each claim "an exogenous promoter region which functions ... to cause the production of a mRNA molecule." According to part "(A)" of these claims the promoter "comprises SEQ ID NO: 1 or a complement thereof...." We find no clear disclosure in the specification that SEQ ID NO: 1 is capable of functioning as a promoter region in plant cells to cause the production of a mRNA molecule. As we understand it, part "(A)" of these claims is open to at least three possible interpretations:

1. SEQ ID NO: 1 contains a promoter region which does function in plant cells to cause the production of a mRNA molecule,
2. SEQ ID NO: 1 does not contain a "promoter region," but instead contains a "regulatory element"² that acts in concert with a promoter region operably attached, either 5' or 3', to SEQ ID NO: 1, and thereby serves to regulate the expression of a mRNA molecule. For example, SEQ ID NO: 1 is an enhancer regions which is incapable of acts on a promoter, but is insufficient to function in plant cells to cause the production of a mRNA molecule on its own, or
3. SEQ ID NO: 1 contains neither a promoter region nor a regulatory element and simply serves as a filler sequence between the promoter region and a structural nucleic acid molecule, as defined in part "(B)" of these claims. For example, SEQ ID NO: 1 is incapable of functioning in plant cells to cause the production of a mRNA molecule, but instead serves only to

² See e.g. appellant's specification, page 17.

maintain the proper distance between a promoter and a "regulatory element."

It may be that the examiner is of the opinion that SEQ ID NO: 1 does not contain a promoter element. Cf. interpretation 3 above. The examiner, however, has not provided a sufficient evidentiary basis on this record to establish that SEQ ID NO: 1 does not contain a promoter or regulatory region, or if it does, why a person of ordinary skill in the art would reasonably doubt that the sequence would not function as a promoter or regulatory region.

For the foregoing reasons we remand the application to the examiner for further consideration. Prior to any further action on the merits, we encourage the examiner to take a step back and reconsider the claimed invention together with appellant's specification and the relevant prior art. In this regard, we remind the examiner as set forth in In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), "claims must be interpreted as broadly as they reasonably, allow, in order to achieve complete exploration of applicant's invention and its relationship to prior art, so that ambiguities can be recognized, scope and breadth of language explored, and clarification imposed."

Accordingly, prior to taking any action on the record, we encourage the examiner to determine the broadest reasonable interpretation of the claimed invention and to include an analysis of this claim construction in any subsequent Office Action. If, after the examiner has evaluated the scope of the claim, the examiner believes that a rejection is necessary, the examiner should include on this record, an analysis of the claim construction together with a reasoned, fact-

based analysis of claimed invention together with the evidence necessary to support any such rejection.

In addition, we note that appellant has disclosed and argued that a nucleic acid molecule comprising SEQ ID NO: 1 has a number of utilities, e.g., for identifying the presence or absence of a polymorphism, or as probes for other molecules or as a source for primers (see e.g., Brief, pages 7-11). These issues and arguments, however, bear a close resemblance to those presented in Ex parte Fisher, 72 USPQ2d 1020 (Bd. Pat. App. & Int. 2004) (affirming the rejection of claim 1 under 35 U.S.C. § 101 and § 112, first paragraph.). Accordingly, we encourage both the examiner and appellants to take the opportunity to reconsider their arguments on this record and to take into account the effect, if any, that Fisher may have on the issues under 35 U.S.C. § 101 and § 112, first paragraph.

REVERSED-IN-PART and REMANDED


William F. Smith
Administrative Patent Judge


Donald E. Adams
Administrative Patent Judge


Lora M. Green
Administrative Patent Judge

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Appeal No. 2004-1772
Application No. 09/552,087

Page 11

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The opinion in support of the decision being entered today was not written
for publication and is not binding precedent of the Board.

Paper No. 26

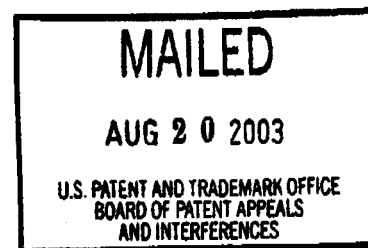
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte JOSEPH R. BYRUM,
THOMAS J. La ROSA, and
GREGORY R. HECK,

Appeal No. 2002-0078
Application No. 09/206,040

ON BRIEF



Docketed
Due Date 10-20-03
Initial IB

Before STONER, Chief Administrative Patent Judge, and WILLIAM F. SMITH and
SCHEINER, Administrative Patent Judges.

WILLIAM F. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from an examiner's final
rejection of claims 1 through 3, which read as follows:¹

¹ A copy of SEQ ID No. 1 is attached to this opinion.

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1. A nucleic acid molecule isolated from other nucleic acid molecules and comprising SEQ ID No. 1 or its complement.
2. A nucleic acid molecule consisting of SEQ ID No. 1 or its complement.
3. A nucleic acid molecule isolated from other nucleic acid molecules and consisting essentially of SEQ ID No. 1 or its complement.

Claims 1 through 3 stand rejected under 35 U.S.C. § 101 (utility) and § 112, first paragraph (enablement). Claims 1 and 3 also stand rejected under 35 U.S.C. § 112, first paragraph (written description). We affirm the utility and enablement rejections and do not reach the merits of the written description rejection. Since our reasons for concluding that the claims lack patentable utility differ substantially from those advanced by the examiner, we denominate our affirmance as a new ground of rejection under 37 CFR § 1.196(b).

Background

The nucleic acid molecule set forth in SEQ ID No. 1 is stated to be an expressed sequence tag (EST) obtained from soybean plant material. Specification, page 14 ("The present invention provides soybean ESTs . . ."), Appeal Brief, page 2 ("The invention is directed to nucleic acid molecules reciting the sequence of an expressed sequence tag . . ."). ESTs are "short sequences of randomly selected clones from a cDNA (or complementary DNA) library which are representative of the cDNA inserts of these randomly selected clones." Specification, page 1. As explained in Examples 1 and 2 of the specification, the claimed EST was obtained from a cDNA library prepared

from young soybean seeds collected from young pods.² The cDNA library from which the nucleic acid molecule set forth in SEQ ID No. 1 was isolated has been designated LIB3049. Specification, page 18.

The three claims before us for review define the claimed nucleic acid molecule as comprising, consisting of, or consisting essentially of SEQ ID No. 1 or its complement. Appellants explain that a nucleic acid molecule is said to be the 'complement' of another nucleic acid molecule if it exhibits complete complementarity, stating "[a]s used herein, molecules are said to exhibit 'complete complementarity' when every nucleotide of one of the molecules is complementary to a nucleotide of the other." Specification, page 16. However, appellants back away from this absolute definition of "complement" stating that "[d]epartures from complete complementarity are permissible, as long as such departures do not completely preclude the capacity of the molecules to form a double stranded structure." Specification, page 17.

The specification sets forth a number of utilities for the nucleic acid molecule of SEQ ID No. 1 which are summarized by the examiner as follows:

The utilities disclosed for the EST of SEQ ID NO: 1 or fragment thereof, or a nucleic acid molecule comprising same are:

² The record contains conflicting statements in regard to the source of the cDNA library from which the claimed EST was isolated. Example 1 states that the cDNA library was obtained from young seeds collected from young pods while page 24 of the specification states that the nucleic acid molecules of the present invention "were isolated from pods and seeds." (Emphasis added). Appellants summarize their invention at page 2 of the Appeal Brief stating that "[t]he claimed nucleic acid molecules were derived from a cDNA collection prepared from young soybean pods." Thus, it is unclear whether the cDNA library was obtained from young seeds, young pods, or a combination of young seeds and young pods. If prosecution is resumed on this subject matter, appellants should clarify the source of the claimed nucleic acid molecule.

sequences corresponding to the claimed nucleic acid molecule in a genome, and then use as a probe for detecting the polymorphisms, which serve as a molecular marker, either a) for a mutation affecting the expression of a product encoded, at least in part, by the claimed nucleic acid molecule (specification, pages 27-28) or b) for a desirable trait that is genetically linked to the polymorphism (specification, pages 35-36);

- Use of the EST as a probe for detecting a physical map location, e.g. as a marker in in situ hybridization;
- Use as a probe or source of PCR primers either to isolate other nucleic acid molecules (e.g. complete cDNA, protein coding sequence, genomic fragment, promoter, start of a chromosome walk) from the same organism or different organisms, i.e. other plants, or to detect other nucleic acid molecules (e.g. mRNA, chromosomal region, chromosome). Disclosed for the latter, for example, is to detect the mRNA in different tissues or as a measure of protein expression from the mRNA (based on mRNA levels), particularly if there is a mutation (hypothetical) affecting expression;
- Use of the EST as an antisense inhibitor of the corresponding mRNA; and
- Use as a probe to identify or isolate proteins that might bind to the EST sequence.

Examiner's Answer, pages 4-5. In the opinion of the examiner:

Each of these utilities requires additional knowledge about the EST before the EST can be used for a specific purpose, such as: whether there are sequence polymorphisms linked to the gene corresponding to the EST and, if so, their identity; the map location of the corresponding gene; the sequence of the corresponding complete mRNA sequence, protein coding sequence or genomic sequence; the function of the protein encoded by the corresponding mRNA; the identity and phenotype, if any, of a mutation in the corresponding gene; the tissue distribution of the corresponding mRNA and tissue-specific expression levels; etc. The specification does not provide any such information specific to the disclosed EST. Consequently, the disclosed utilities are non-specific utilities, since any of the general disclosed utilities would apply equally to any uncharacterized nucleic acid molecule from soybean in particular, or plants in general.

Examiner's Answer, paragraph bridging pages 5-6.

The examiner concludes:

In Brenner v. Manson, 148 USPQ 689, 696 (US, 1966), the Court held that "Congress intended that no patent be granted on a chemical compound whose sole "utility" consists of its potential role as an object of use-testing", and stated, in context of the utility requirement, that "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." The original disclosure lacks any successful conclusion for even one of the vague and general utilities disclosed. Thus, no "substantial" or "real world" utility has been disclosed.

Examiner's Answer, page 6.

Appellants urge that the claims on appeal possess patentable utility under 35 U.S.C. § 101. See, e.g., Appeal Brief, page 19 ("Applicants have disclosed numerous utilities for the claimed nucleic acid molecules, and have submitted evidence proving that the claimed nucleic acid molecules work for at least two of the disclosed utilities."). In presenting their case on appeal, appellants focus on use of the claimed nucleic acid molecules to identify the presence or absence of a polymorphism, and their use as probes or as a source for primers. Appeal Brief, pages 11-18.

In support of their position, appellants rely upon the declaration of Dr. Roger C. Wiegand.³ Dr. Wiegand states that "EST databases are useful tools that may be used to select clones for further research, or to compare sequences in the database with other sequences, but the nucleic acid molecules represented by the ESTs themselves have value beyond that associated with their ESTs." Wiegand decl., para. 6. Dr. Wiegand also states that "ESTs are typically used to develop molecular markers,

³ Appellants also refer to a La Rosa declaration in the heading appearing on page 4 of the Appeal Brief. However, the La Rosa declaration is only directed to the deposit of clone designated LIB-3049-003-Q1-E1-H7 with the ATCC.

hybridization probes, amplification primers, and to identify the presence or absence of polymorphisms." Wiegand decl., para. 7. Dr. Wiegand also discusses the results of tests performed with a nucleic acid molecule "having the sequence of SEQ ID No. 1" in regard to its use as a hybridization probe in detection of genetic polymorphism, stating:

19. The results of the northern blots indicate that a nucleic acid molecule having the sequence of SEQ ID NO: 1 can be synthesized and successfully used as a hybridization probe, and that such a molecule will hybridize to a naturally occurring soybean nucleic acid molecule. Accordingly, a nucleic acid molecule having SEQ ID NO: 1 is useful as a hybridization probe for expression profiling or other purposes.

21. I believe that a nucleic acid molecule comprising the EST of SEQ ID NO: 1 possesses the practical utility of being useful for detecting polymorphisms because scientists under my supervision performed Southern blots to test if a synthetic nucleic acid molecule based on SEQ ID NO: 1 would detect polymorphisms. It did.

23. The results of the Southern blots indicate that a nucleic acid molecule having the sequence of SEQ ID NO: 1 can be synthesized and successfully used to detect polymorphisms in soybean chromosomal DNA. Accordingly, a nucleic acid molecule having the sequence of SEQ ID NO: 1 is useful for detecting polymorphisms in order to develop a genetic map, determining if a plant carries the gene for a particular trait, determining the copy number of a particular gene in a plant, or for other purposes.

Wiegand decl., paras. 19, 21, and 23.

In regard to claim construction, the examiner states in the context of setting forth the enablement rejection:

The recitation of "consisting essentially of" in claim 3 has been treated as being equivalent to "comprising", as recited in claim 1. There is nothing on the record to indicate how "consisting essentially of" alters the scope of claim 3 compared to claim 1. Thus, claim 3 would not exclude any embodiment embraced by claim 1.

Examiner's Answer, page 7. The examiner has determined that claims 1 and 3 embrace an "essentially infinite genus of nucleic acid molecules" (Examiner's Answer, page 8) and that the specification does not "teach the maximum length or locations (5' end, 3' end, or both ends, of nucleic acid sequence(s) that could be added to SEQ ID NO: 1, that would not interfere with its disclosed use as a hybridization probe." Id. The examiner is also of the opinion that "[s]ince the claims embrace adding any and all nucleic acid sequences to the core nucleic acid molecule SEQ ID NO: 1, one cannot predict whether or not the additional nucleic acid sequence[s] added would hybridize to a target nucleic acid molecule other than the intended target nucleic acid molecule. When such a situation occurs, and more than one nucleic acid molecule is amplified or detected in hybridization, the skilled artisan would have no information that would allow the desired target nucleic acid molecule to be distinguished from a nucleic acid molecule that was targeted by the added nucleic acid sequences." Examiner's Answer, page 9. The examiner concludes:

Consequently, making the myriad of nucleic acid molecules embraced by the claims and testing the suitability of each for use as a probe or primer for the disclosed utilities in the absence of guidance or examples would require excessive trial and error experimentation due to the unpredictability involved, and would therefore require undue experimentation.

Id.

In reaching the conclusion of undue experimentation, the examiner did not perform an analysis of the so-called Wands factors. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404, (Fed. Cir. 1988). In contrast to the examiner's position,

appellants provide an analysis of the Wands factors in support of their position that the claim are enabled. Appeal Brief, pages 27-36.

The examiner's reasoning in regard to the written description rejection is:

Claims 1 and 3 are drawn to nucleic acid molecules "comprising" or "consisting essentially of" the EST of SEQ ID NO: 1; and therefore to an astronomically large genus of nucleic acid molecules comprising SEQ ID NO: 1 even solely considering nucleic acid sequences and ignoring nucleic acid molecules comprising non-nucleotide moieties such as detectable labels. The specification does not explicitly disclose any nucleic acid molecules that "comprise" or "consist essentially of" SEQ ID NO: 1, other than that of SEQ ID NO: 1 itself (either unlabeled or labeled with a detectable non-nucleotide moiety such as a fluorophor) and the clone from which the sequence was derived. Any additional cDNA sequence that may be present on the clone was not described other than by deposit. No nucleic acid molecules are disclosed wherein the nucleic acid sequence is extended beyond SEQ ID NO: 1, other than solely by implication a larger EST or mRNA comprising SEQ ID NO: 1. However, the specification does not disclose the structure of any such larger nucleic acid molecule or EST or mRNA. The disclosure of the single nucleic acid molecule set forth as SEQ ID NO: 1 does not adequately describe the astronomically large number of possible nucleic acid molecules embraced by claims 1 and 3.

Examiner's Answer, page 10.

Appellants respond that the specification reflects their "possession" of the claimed invention. Appeal Brief, pages 36-41.

Discussion

As always, we begin our analysis by construing the claims as "the name of the game is the claim." In re Hiniker Co., 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998)(citing Giles Sutherland Rich, Extent of Protection and Interpretation of Claims--American Perspectives, 21 Int'l Rev. Indus. Prop. & Copyright L. 497, 499 (1990). See also, Panduit Corp. v. Dennison Manufacturing Co., 810 F.2d 1561, 1567-

68, 1 USPQ2d 1593, 1597 (Fed. Cir.), cert. denied, 481 U.S. 1052 (1987) ("Analysis begins with a key legal question--what is the invention claimed? ... Claim interpretation ... will normally control the remainder of the decisional process."). The claim analysis which appears in the Appeal Brief and the Examiner's Answer provides little assistance in our review of the issues presented in this appeal. For example, appellants state "[t]he genus of claimed nucleic acid molecules, i.e., nucleic acid molecules 'comprising,' 'consisting of,' and 'consisting essentially of' SEQ ID No. 1 have been described by the recitation of a 'basic and novel' common structural feature - the nucleotide sequence of SEQ ID No. 1 - which distinguishes them from nucleic acid molecules not in the claimed genus." Appeal Brief, page 4. Appellants have not explained on this record how a nucleic acid molecule which "comprises" the nucleotide sequence of SEQ ID No. 1 differs from a nucleic acid molecule "consisting of" or "consisting essentially of" the nucleotide sequence of SEQ ID No. 1. Appellants' arguments for the most part are couched in vague, non-specific terms such as "the claimed nucleic acid molecules," instead of referring to actual claims and the language used therein. See, e.g., Appeal Brief, page 8, first full paragraph ("Applicants have asserted specific utilities for the claimed nucleic acid molecules...."). Importantly, appellants have not offered any assistance in the Appeal Brief as to how broadly or narrowly they would have the word "complement" construed as it is used in claims 1-3 on appeal.

The one specific statement we find in the Examiner's Answer construing the claims on appeal is contrary to governing precedent and, thus, is in error. The examiner states "[t]he recitation of 'consisting essentially of' in claim 3 has been treated

as being equivalent to 'comprising', as recited in claim 1. There is nothing on the record to indicate how 'consisting essentially of' alters the scope of claim 3 compared to claim 1. Thus, claim 3 would not exclude any embodiment embraced by claim 1."

Examiner's Answer, page 7, fourth full paragraph. The examiner's holding that the transitional phrase "consisting essentially of" is equivalent to the transitional phrase "comprising" is contrary to long established precedent. In re Janakirama-Rao, 317 F.2d 951, 954, 137 USPQ 893, 896 (CCPA 1963) ("The word 'essentially' opens the claims to the inclusion of ingredients which would not materially affect the basic and novel characteristics of appellants' compositions as defined in the balance of the claim, according to the applicable law."). Assuming the examiner is correct in concluding there is "nothing on the record" that would allow the examiner to distinguish between a claim using the transitional phrase "consisting essentially of" and the same claim using the transitional phrase "comprising," we do not find that to be sufficient justification for the examiner to upend decades of precedent. These transitional phrases have defined meanings in the law. The fact that an examiner is having trouble distinguishing the scope of claims 1 and 3 on the basis of the transitional phrases used may, however, be an indication that the claims are indefinite under 35 U.S.C. § 112, second paragraph. In re Hammack, 427 F.2d 1378, 1382, 166 USPQ 204, 208 (CCPA 1970) (Purpose of 35 U.S.C. § 112, second paragraph, "is to provide those who would endeavor, in future enterprise, to approach the area circumscribed by the claims of a patent, with the adequate notice demanded by due process of law, so that they may more readily and

accurately determine the boundaries of protection involved and evaluate the possibility of infringement and dominance.").

Additional ambiguity is injected in the claims by use of the word "complement" and the reference in the claims to SEQ ID No. 1. As discussed above, the specification contains a very strict definition of complement, i.e., every nucleotide of one of the molecules is complementary to a nucleotide of another nucleic acid molecule, while at the same time indicating that the nucleic acid molecules according to the present invention may depart from "complete complementarity." Thus, determining what constitutes a "complement" of the claimed nucleic acid molecules as that word is used in the claims on appeal is problematic.

The reference in the claims to SEQ ID No. 1 is also subject to interpretation as appellants state "[a]n aspect to the present invention is that the nucleic acid molecules of the present invention include nucleic acid molecules that are degenerate of that set forth in SEQ ID No. 1." Specification, page 18. As acknowledged by appellants, "a nucleic acid molecule is degenerate of another nucleic acid molecule when the nucleic acid molecules encode for the same amino acid sequences but comprise different nucleotide sequences." Id. The nucleotide sequence depicted in SEQ ID No. 1 does not indicate the reading frame or contain an assigned amino acid sequence. Without such knowledge, it is unclear how one would consider a given nucleotide sequence to be "degenerate" of that depicted in SEQ ID No. 1. Thus, if the claims on appeal are to be read as encompassing degenerate nucleotide sequences, the determination of the identity of such degenerate molecules would be difficult.

Having a firm understanding of the scope of the claims under review is also necessary in evaluating appellants' rebuttal evidence in regard to the utility rejection. For example, Dr. Wiegand states "the synthetic probe is a true enough copy of SEQ ID No. 1 for use as a probe to demonstrate the utility of nucleic acid molecules characterized by SEQ ID No. 1." Wiegand Declaration, para. 16. (Emphasis added). If one cannot readily determine whether a given nucleotide sequence is within or without the scope of the claims under review, it is difficult to assign weight to evidence which is based upon "a true enough copy of SEQ ID No. 1."

The ability or inability to reasonably ascertain the metes and bounds of a claim is important in determining whether the claim possesses patentable utility under § 101 as all embodiments within a claim must meet the utility requirement. In re Langer, 503 F.2d 1380, 1394, 183 USPQ 288, 299 (CCPA 1974) ("We hold that appellant's evidence of record is insufficient to rebut the prima facie case for lack of utility in the subject matter (other than [preferred species]) recited in these claims."). In similar fashion, it is difficult to determine whether a given claim is enabled throughout its scope without undue experimentation without first knowing the scope of the claim under review. In re Moore, 439 F.2d 1232, 1236, 169 USPQ 236, 238 (CCPA 1971) ("Once having determined that the subject matter defined by the claims is particular and definite, the analysis then turns to the first paragraph of § 112 to determine whether the scope of protection sought is supported and justified by the specification disclosure.") (Emphasis added). The same holds true in considering the written description requirement of the first paragraph of § 112. Enzo Biochem, Inc. v. Gen-Probe, Inc., 296

F.3d 1316, 1327, 63 USPQ2d 1609, 1615 (Fed. Cir. 2002) ("On remand, the court should determine whether a person of skill in the art would glean from the written description, including information obtainable from the deposits of the claimed sequences, subsequences, mutated variants and mixtures sufficient to demonstrate possession of generic scope of the claims.").

Reaching a decision on a record such as this is difficult. However, we do know that the claims on appeal include one discrete and definite embodiment not subject to interpretation, alternative construction, ambiguity or spin of any type, i.e., the precise 469 nucleotide sequence set forth in SEQ ID No. 1 without any preceding or trailing nucleotides.

Thus, we will proceed to a decision on the issues raised in this appeal to the extent that claims 1 through 3 on appeal include the nucleic acid molecule defined by the 469 nucleotide sequence set forth in SEQ ID No. 1 without alteration or any preceding or trailing nucleotides as this is the only subject matter that we can say with certainty is included within each of the claims.

1. Utility.⁴

The starting point for determining whether a nucleic acid molecule having the 469 nucleotide sequence set forth in SEQ ID No. 1 possesses utility under 35 U.S.C.

⁴ Appellants refer to the "Revised Utility Examination Guidelines, 64 Fed. Reg. 71440, 71442" in presenting their case on appeal. See, e.g., Appeal Brief, page 5. Those guidelines were superseded by Utility Examination Guidelines, 66 Fed. Reg. 1092 (Jan. 5, 2001). Although the Appeal Brief and the Examiner's Answer were prepared after that date, it does not appear that either appellants or the examiner considered the latest version of the guidelines in preparing the briefing in this appeal. Be that as it may, we note that the utility guidelines expressly state that they do not have the force or effect of law, see id. at 1098, and our analysis is based instead on controlling precedent. We note, however, that our conclusion is consistent with the utility guidelines.

§ 101 is Brenner v. Manson, 383 U.S. 519, 148 USPQ 689 (1966). The Court stated "the basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until [an invention] is refined and developed to this point--where specific benefit exists in currently available form--there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.⁵ In considering the issues presented in this appeal, special attention must be paid to the Court's statement that a patent should issue only when an invention possesses "substantial utility," i.e., "where a specific benefit exists in currently available form." Whether a claimed invention is useful under 35 U.S.C. § 101 is a question of fact. Cross v. Iizuka, 753 F.2d 1040, 1044 n.7, 224 USPQ 739, 742 n.7 (Fed. Cir. 1985).

At issue in Brenner was a claim to "a chemical process which yields an already known product whose utility—other than as a possible object of scientific inquiry—ha[d] not yet been evidenced." Id. at 529, 148 USPQ at 693. The Patent Office had rejected the claimed process for lack of utility, on the basis that the product produced by the claimed process had not been shown to be useful. See id. at 521-22, 148 USPQ at 690. On appeal, the Court of Customs and Patent Appeals reversed, on the basis that

⁵ In discussing the issue of utility under 35 U.S.C. § 101, the Federal Circuit and the Court of Customs and Patent Appeals since Brenner, has used the phrases "substantial utility" and "practical utility" interchangeably. See, e.g., Fujikawa v. Wattanasin, 93 F.3d 1559, 1963-1964, 39 USPQ2d 1895, 1898-1899 (Fed. Cir. 1996) ("It is well established that a patent may not be granted to an invention unless substantial or practical utility for the invention has been discovered and disclosed.").

"where a claimed process produces a known product it is not necessary to show utility for the product." Id. at 522, 148 USPQ at 691.

The Brenner Court noted that although § 101 requires that an invention be "useful," that "simple, everyday word can be pregnant with ambiguity when applied to the facts of life." Id. at 529, 148 USPQ at 693. Thus,

[i]t is not remarkable that differences arise as to how the test of usefulness is to be applied to chemical processes. Even if we knew precisely what Congress meant in 1790 when it devised the "new and useful" phraseology and in subsequent re-enactments of the test, we should have difficulty in applying it in the context of contemporary chemistry, where research is as comprehensive as man's grasp and where little or nothing is wholly beyond the pale of "utility"—if that word is given its broadest reach.

Id. at 530, 148 USPQ at 694.⁶

The Court, finding "no specific assistance in the legislative materials underlying § 101," based its analysis on "the general intent of Congress, the purposes of the patent system, and the implications of a decision one way or the other." Id. at 532, 148 USPQ at 695. The Court concluded that "[t]he basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field." Id. at 534-35, 148 USPQ at 695.

⁶ The invention at issue in Brenner was a process, but the Court expressly noted that its holding "would apply equally to the patenting of the product produced by the process." Id. at 535, 148 USPQ at 695-96.

The Court considered and rejected the applicant's argument that attenuating the requirement of utility "would encourage inventors of new processes to publicize the event for the benefit of the entire scientific community, thus widening the search for uses and increasing the fund of scientific knowledge." The Court noted that, while there is value to encouraging disclosure, "a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development." Id. at 534, 148 USPQ at 695.

The Court took pains to note that it did not "mean to disparage the importance of contributions to the fund of scientific information short of the invention of something 'useful,'" and that it was not "blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public." Id. at 535-36, 148 USPQ at 696. Those considerations did not sway the Court, however, because "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." Id.

Subsequent decisions of the CCPA and the Court of Appeals for the Federal Circuit have added further layers of judicial gloss to the meaning of § 101's utility requirement. The first opinion of the CCPA applying Brenner was In re Kirk, 376 F.2d

936, 153 USPQ 48 (CCPA 1967). The invention claimed in Kirk was a set of steroid derivatives said to have valuable biological properties and to be of value "in the furtherance of steroidal research and in the application of steroidal materials to veterinary or medical practice." Id. at 938, 153 USPQ at 50. The claims had been rejected for lack of utility. In response, the applicants submitted an affidavit which purportedly "show[ed] that one skilled in the art would be able to determine the biological uses of the claimed compounds by routine tests." Id. at 939, 153 USPQ at 51.

The court held that "nebulous expressions [like] 'biological activity' or 'biological properties'" did not adequately convey how to use the claimed compounds. Id. at 941, 153 USPQ at 52. Nor did the applicants' affidavit help their case: "the sum and substance of the affidavit appear[ed] to be that one of ordinary skill in the art would know 'how to use' the compounds to find out in the first instance whether the compounds are—or are not—in fact useful or possess useful properties, and to ascertain what those properties are." Id. at 942, 153 USPQ at 53.

The Kirk court held that an earlier CCPA decision, holding that a chemical compound meets the requirements of § 101 if it is useful to chemists doing research on steroids, had effectively been overruled by Brenner. "There can be no doubt that the insubstantial, superficial nature of vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher' was recognized, and clearly rejected, by the Supreme Court" in Brenner. See Kirk, 376 F.2d at 945, 153 USPQ at 55.

More recently, in In re Ziegler, 992 F.2d 1197, 26 USPQ2d 1600 (Fed. Cir. 1993), the Federal Circuit considered the degree of specificity required to show utility for a claim to polypropylene. The U.S. application on appeal in Ziegler claimed priority to a German application filed in 1954. "In the German application, Ziegler disclosed only that solid granules of polypropylene could be pressed into a flexible film with a characteristic infrared spectrum and that the polypropylene was 'plastic-like.'" Id. at 1203, 26 USPQ2d at 1605. "Ziegler did not assert any practical use for the polypropylene or its film, and Ziegler did not disclose any characteristics of the polypropylene or its film that demonstrated its utility." Id. The court held that the German application did not satisfy the requirements of § 101 and therefore could not be relied on to overcome a rejection based on an intervening reference. See id., 26 USPQ2d at 1606. "[At] best, Ziegler was on the way to discovering a practical utility for polypropylene at the time of the filing of the German application; but in that application Ziegler had not yet gotten there." Id., 26 USPQ2d at 1605.

On the other hand, the CCPA reversed a rejection for lack of utility in In re Jolles, 628 F.2d 1322, 206 USPQ 885 (CCPA 1980). The applicant in Jolles claimed pharmaceutical compositions that were disclosed to be useful in treating acute myeloblastic leukemia. See id. at 1323, 206 USPQ at 886. The active ingredients in the compositions were closely related to daunorubicin and doxorubicin, both of which were "well recognized in the art as valuable for use in cancer chemotherapy." Id., 206 USPQ at 887. The applicant also submitted declaratory evidence showing that eight of the claimed compositions were effective in treating tumors in a mouse model, and one

was effective in treating humans. See id. at 1323-24, 206 USPQ at 887-88. The court noted that the data derived from the mouse model were "relevant to the treatment of humans and [were] not to be disregarded," id. at 1327, 206 USPQ at 890, and held that the evidence was sufficient to support the asserted therapeutic utility. See id. at 1327-28, 206 USPQ at 891.

The Federal Circuit held in Cross v. Iizuka, 753 F.2d 1040, 224 USPQ 739 (Fed. Cir. 1985), that in vivo testing (as in Jolles) was not necessarily required to show utility in the pharmaceutical context. The Cross court stated that "[it] is axiomatic that an invention cannot be considered 'useful,' in the sense that a patent can be granted on it, unless substantial or practical utility for the invention has been discovered and disclosed where such utility would not be obvious." Id. at 1044, 224 USPQ at 742 (citing Brenner v. Manson). The court "perceive[d] no insurmountable difficulty, under appropriate circumstances, in finding that the first link in the screening chain, in vitro testing, may establish a practical utility for the compound in question." Id. at 1051, 224 USPQ at 748. Successful in vitro testing could provide an immediate benefit to the public, by "marshal[ling] resources and direct[ing] the expenditure of effort to further in vivo testing of the most potent compounds . . . , analogous to the benefit provided by the showing of an in vivo utility." Id. On the facts of that case – successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds – the court held that in vitro activity was sufficient to meet the requirements of § 101. See id.

The Federal Circuit confirmed in In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995), that human testing is not necessary to establish utility for a method of treatment. The invention claimed in Brana was a group of compounds disclosed to have antitumor activity. See id. at 1562, 34 USPQ2d at 1437-38. The specification disclosed that the claimed compounds had higher antitumor activity than related compounds known to have antitumor activity, and the applicants provided declaratory evidence of in vivo activity against tumors in a mouse model. See id., 34 USPQ2d at 1438. The court held that these data were sufficient to satisfy § 101; usefulness in patent law does not require that the invention be ready to be administered to humans. See id. at 1567, 34 USPQ2d at 1442.

Several lessons can be drawn from Brenner and its progeny. First, § 101's requirement that an invention be "useful" is not to be given its broadest reach, such that little or nothing of a chemical nature would be found to lack utility. See Brenner, 383 U.S. at 530, 148 USPQ at 694. Thus, not every "use" that can be asserted will be sufficient to satisfy § 101. For example, the steroid compound at issue in Brenner was useful as a possible object of scientific inquiry, and the polypropylene claimed in Ziegler was useful for pressing into a flexible film, yet both lacked sufficient utility to satisfy § 101. See Brenner, 383 U.S. at 529, 148 USPQ at 696; Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

Rather than setting a de minimis standard, § 101 requires a utility that is "substantial", i.e., one that provides a specific benefit in currently available form. Brenner, 383 U.S. at 534-35, 148 USPQ at 695. This standard has been found to be

met by pharmaceutical compositions shown to be useful in mouse models and in humans for treating acute myeloblastic leukemia (Jolles, 628 F.2d at 1327-28, 206 USPQ at 891); by evidence showing successful in vitro testing supplemented by similar in vitro and in vivo activities of structurally similar compounds (Cross, 753 F.2d at 1051, 224 USPQ at 748); and by evidence showing in vivo antitumor activity in mice, combined with a disclosure that the claimed compounds had higher antitumor activity than a related compound known to have antitumor activity (Brana, 51 F.3d at 1567, 34 USPQ2d at 1442).

By contrast, Brenner's standard has been interpreted to mean that "vague, general disclosures or arguments of 'useful in research' or 'useful as building blocks of value to the researcher'" would not satisfy § 101. See Kirk, 376 F.2d at 945, 153 USPQ at 55 (interpreting Brenner). Likewise, a disclosure of a "plastic-like" polypropylene capable of being pressed into a flexible film was held to show that the applicant was "at best . . . on the way to discovering a practical utility for polypropylene at the time of the filing," but not yet there. Ziegler, 992 F.2d at 1203, 26 USPQ2d at 1605.

With these principles in mind we turn to the issues at hand. Of the many utilities asserted in the specification, two have received the most attention in the briefing in this appeal, i.e., identification and detection of polymorphisms and use as probes or as a source for primers. We shall focus on these asserted utilities first and then address the other arguments set forth in the briefing.

a. Polymorphisms

This utility is discussed at pages 28-35 of the specification in terms of what polymorphisms are and how one would go about determining the existence of a polymorphism. The discussion in this portion of the specification is not specific to the 469 nucleotide molecule depicted in SEQ ID No. 1. Nor does the specification explain why the 469 nucleotide molecule of SEQ ID No. 1 would in fact be useful in detecting polymorphisms. Rather, appellants' argument is that "the claimed nucleic acid molecules have utility even if the absence of a particular polymorphism is detected. Indeed, the absence of a polymorphism usually demonstrates that the two (or more) populations being compared share a common genetic heritage." Appeal Brief, page 14. In other words, appellants' position is that an EST by definition possesses patentable utility because it can be used by itself in determining whether populations share a common genetic heritage. While that may be a "utility," we do not find that it is a substantial utility.

Without knowing any further information in regard to the gene represented by an EST, as here, detection of the presence or absence of a polymorphism provides the barest information in regard to genetic heritage and can be viewed to be at the lower end of the utility spectrum. At the high end of the utility spectrum would be information gleaned from detecting the presence or absence of a polymorphism when it is known what effect the gene from which the EST is derived has in the development and/or phenotype of the plant. Somewhere between having no knowledge of the gene and its role in the plant's development and phenotype (the present circumstances) and having

complete knowledge of the gene and its role in the plant's development and/or phenotype lies the line between "utility" and "substantial utility." We need not draw the line or further define it in this case because the facts in this case represent the lowest end of the spectrum, i.e., an insubstantial use.

Dr. Wiegand's declaration does not aid appellants in this aspect of their case. Polymorphism as a utility is discussed primarily in paragraphs 20-23 of the declaration. Two probes were used in Dr. Wiegand's work, "a synthesized nucleic acid molecule based on overlapping oligomers matching SEQ ID No. 1; and a probe derived from the plasmid that carries clone LIB3049-003-Q1-E1-H7, from which SEQ ID No. 1 was determined." Dr. Wiegand concludes that "a nucleic acid molecule having a sequence of SEQ ID No. 1 can be synthesized and successfully used to detect polymorphisms in soybean chromosomal DNA. Accordingly, a nucleic acid molecule having the sequence of SEQ ID NO. 1 is useful for detecting polymorphisms in order to develop a genetic map, determining if a plant carries the gene for a particular trait, determining the copy number of a particular gene in a plant, or for other purposes."

First, the precise identity of the nucleic acid molecules used in Dr. Wiegand's work is unclear. As stated above, we are limiting our consideration of the issues raised in this appeal as they pertain to the precise 469 nucleotide molecule set forth in SEQ ID No. 1. Dr. Wiegand's conclusions are premised upon use of "a nucleic acid molecule having the sequence of SEQ ID No. 1." It is unclear whether the probes used contained only the specific 469 nucleotides depicted in SEQ ID No. 1 or contained

additional nucleotides before and/or after the specific 469 nucleotide molecule set forth in SEQ ID No. 1.

In any case, it is not clear how the results reported in the declaration establish a substantial utility. Dr. Wiegand does not state in his declaration that these results provide any significant knowledge. To the contrary, they appear to represent what one might reasonably assume—a given EST may or may not detect a polymorphism in a related organism. While such knowledge may indicate the molecule is "useful" to some degree, we do not find that it represents a substantial utility.⁷

b. Probes or source of primers

Appellants argue that the specification "discloses that the claimed nucleic acid molecules can be used to isolate nucleic acid molecules of other plants and organisms...." Appeal Brief, page 16. While that may be true, it begs the question of what substantial use such knowledge would have? Again, the present specification does not attribute any property in terms of plant trait, or phenotype to the 469

⁷ We are aware that the examiner and appellants have engaged in a discussion on this record as to whether the specific soybean plants used in Dr. Wiegand's work are species and thus, whether the work is relevant in determining the utility issue. However, the manner in which the examiner and appellants have raised this issue in the context of this appeal proceeding does not provide a reasonable basis for its review. As stated by appellants, the issue was raised in an Advisory Action. Appeal Brief, page 15. Appellants responded to the assertions made in the Advisory Action by relying upon a dictionary definition in the Appeal Brief. The examiner discusses this portion of the Appeal Brief on pages 34-35 of the Examiner's Answer, stating that the cited dictionary reference was not provided and could not be evaluated by the examiner. The examiner then goes on to cite two other documents in support of his position. Appellants did not file a Reply Brief.

An appeal should be contested upon a fixed record, not upon an ever expanding and shifting record as here. It does not appear that appellants made the requisite showing under 37 CFR § 1.195 in presenting new evidence in conjunction with this appeal nor is it apparent that the examiner had authority to rely upon new evidence in support of his position. Under these circumstances, we decline to consider the issue.

nucleotide molecule of SEQ ID No. 1. Why does knowledge that a similar molecule may exist in another organism represent a substantial utility?

The same analysis holds for the stated utility that a nucleic acid molecule may be used in a "chromosome walk." Id., pages 16-17. In presenting this argument, appellants run afoul of the confusion engendered as to the source of the present nucleic acid molecules. Appellants' argument at page 17 of the Appeal Brief is couched in terms of the ability to isolate a promoter that is active in young seed pods (5 to 15 days after flowering). It appears that this argument is premised upon the fact that the nucleic acid molecule of the present invention was obtained from young seed pods. However, as explained above, the examples of the specification state that the nucleic acid molecule was obtained from young seeds collected from young pods.

Appellants state that the examiner denigrated the "chromosome walk" utility by stating in the Final Rejection that "[a]ny nucleic acid molecule from any plant cell generally serves this purpose...." Appeal Brief, page 16. Appellants argue in essence that despite the fact that the argued utility applies to all ESTs, there is no legal requirement that an invention's utility be "unique" to the invention, i.e., an invention can be a member of a class, where all the members of the class share a common utility.

First, appellants have only been required to identify a utility that is specific to the invention claimed. See, e.g., Brenner, 383 U.S. at 534, 148 USPQ at 695 (An invention does not have utility sufficient to satisfy § 101 until it is "refined and developed" to the point of providing a specific benefit in currently available form.). An invention certainly can have a utility that is shared by other compounds or compositions. Take, for

example, an application that claims ibuprofen and discloses that it is useful as an analgesic. No one would argue that a claim to ibuprofen lacks utility simply because aspirin and acetaminophen are also useful as analgesics. On the other hand, not every utility will satisfy § 101, even if the utility is shared by a class of inventions. Assume that the above-described application did not disclose that ibuprofen was an analgesic but only disclosed that it is useful because it can be used to fill a jar, which would then be useful as a paperweight. There would be little doubt that this disclosed utility would not satisfy § 101, even though the utility is shared by a large class of inventions, viz., those whose physical embodiments have mass. So while a utility need not be unique to a claimed invention, it must nonetheless be specific, and in currently available form, in order to satisfy § 101.

Nor does Dr. Wiegand's declaration assist appellants in this portion of their position on appeal. Dr. Wiegand discusses the use of EST's to generate probes in paragraphs 14-17 of his declaration. However, that work is based upon a synthetic probe stated to be "a true enough copy of SEQ ID No. 1." It is not apparent why evidence based upon "a true enough copy" of SEQ ID No. 1 is relevant in this appeal.

c. Other Arguments⁸

Appellants argue that the specification describes other utilities for the claimed nucleic acid molecules including "introduction of the claimed nucleic acid molecules into a plant or plant cell (either as sense or antisense inhibitors), which can then be used to screen for compounds such as a herbicide." Appeal Brief, page 10. Specifically, appellants argue that a compound can be provided to both an antisense plant and a control plant not having antisense, with the effect of the compound on the plant being monitored. Appellants analogize this proposed procedure to a "cell-based assay" which appellants assert to have a "legally sufficient utility." Id.

Suffice it to say that an otherwise uncharacterized nucleic acid molecule is being claimed in this application, not an assay. The portion of the specification cited in support of this argument (page 64) indicates that the nucleic acid molecule must be introduced into a plant cell and transcribed using an appropriate promoter to result in the co-suppression of an endogenous protein. The specification does not indicate that such a method is feasible when the nucleic acid to be used is uncharacterized as here. Such a use does not provide a specific or substantial benefit in currently available form.

⁸ Appellants present arguments in the Appeal Brief responding to issues apparently raised by the examiner previously but not maintained in the statement of rejection in the Examiner's Answer. For example, appellants argue that the examiner was incorrect as characterizing the claimed nucleic acid molecules as "tools" in the Final Office Action and Advisory Action. Appeal Brief, pages 11-12. However, the examiner does not characterize the claimed nucleic acid molecules in that manner in stating the utility rejection on pages 4-7 of the Examiner's Answer. Appellants also present arguments on pages 23-26 of the Appeal Brief in regard to whether the claimed nucleic acid molecules correspond to a pseudogene or are an artifact. However, in presenting his position on appeal the examiner does not rely upon either theory in stating the rejection, Examiner's Answer, pages 4-7. Apparently, the examiner no longer relies upon these rationales. Thus, we need not consider these issues.

Appellants also argue that the claimed nucleic acids are useful to measure the level of mRNA in a sample through use of microarray technology and use as molecular markers. Appeal Brief, pages 10-11. In regard to microarrays, appellants argue that it is "standard practice" to screen populations of nucleic acids with EST sequences without characterizing each and every target mRNA. Reference to para. 14 of the Wiegand declaration is made in support. Appeal Brief, page 11, n. 5. Dr Wiegand states "Soybean DNA clones are routinely used to detect expression levels of corresponding naturally occurring soybean nucleic acids. A nucleic acid molecule of SEQ ID NO: 1 can also certainly be used to detect expression level. Use of a nucleic acid molecule representing an EST as an expression probe is a practical use because it enables the detection of changes in expression of a particular gene." Wiegand decl., para. 14.

We find that the asserted utility of the claimed nucleic acid—as one component of an assay for monitoring gene expression—does not satisfy the utility requirement of § 101. Such a use does not provide a specific benefit in currently available form.

We accept, for argument's sake, that a person skilled in the art could use the claimed nucleic acid, in combination with other nucleic acids, to monitor changes in expression of the gene that encompasses the nucleic acid depicted in SEQ ID NO: 1. However, the specification provides no guidance which would allow a skilled artisan to use data relating to expression of such a gene in any practical way. The specification simply provides no guidance regarding what the SEQ ID NO: 1-specific information derived from a gene expression experiment would mean.

Suppose, for example, that a researcher found that SEQ ID NO: 1 expression was increased when a cell was treated with a particular agent. The specification provides no basis on which a skilled worker would be able to determine whether that result is meaningful. Maybe the meaning in a change in SEQ ID NO: 1 expression would depend on other factors, but again the specification provides no hint what other factors might be important. Would it depend on what agent is used, what cell type is used, the behavior of other genes (if so, which genes and what behavior is significant), the degree of increase? The specification simply provides no guidance as to how to interpret the results that might be seen using SEQ ID NO: 1 in a gene expression assay.

In effect, appellants' position is that the claimed nucleic acids are useful because those of skill in the art could experiment with them and figure out for themselves what any observed experimental results might mean. We do not agree that such a disclosure provides a "specific benefit in currently available form." Rather, the present case seems analogous to Brenner. In Brenner, the applicant claimed a method of making a compound but disclosed no utility for the compound. 383 U.S. at 529, 148 USPQ at 693. The Court held that a process lacks utility if it produces a product that lacks utility. Id. at 534, 148 USPQ at 695. Here, appellants claim a product asserted to be useful in a method of generating gene-expression data, but the specification does not disclose how to interpret those data. Just as the process claimed in Brenner lacked utility because the specification did not disclose how to use the end-product, the products claimed here lack utility, because even if used in gene expression assays, the

specification does not disclose how to use SEQ ID NO: 1-specific gene expression data.

Here, appellants assert that SEQ ID NO: 1, along with every other expressed soybean gene or protein, or for that matter, any expressed gene or protein, can be used to monitor changes in gene expression. However, without additional information, any observed results of changed expression of SEQ ID NO: 1 would have no meaning. The specification in effect discloses that the claimed nucleic acids can be used to monitor gene expression, and those of skill in the art will figure out what to do with the gene expression data. This utility is not substantial; it does not provide a specific benefit in currently available form.

Assuming arguendo that a generic gene expression assay—one based on monitoring expression of thousands of uncharacterized nucleic acids would provide a useful tool for, e.g., drug discovery, it does not follow that each one of the nucleic acids represented in the assay individually has patentable utility. Although each nucleic acid in the assay contributes to the data generated by the assay overall, the contribution of a single nucleic acid—its data point—is only a tiny contribution to the overall picture. The Brenner Court held that § 101 sets more than a de minimis standard for utility. Therefore, the patentable utility of a gene expression assay, for example, does not necessarily mean that each tiny component of the assay also has patentable utility. A patentable utility divided by a thousand does not necessarily equal a thousand patentable utilities. Each claimed invention must be shown to meet § 101's utility requirement in order to be patentable; it must provide a specific benefit in currently

available form. Providing a single data point among thousands or millions, even if the thousands or millions of data points collectively are useful, does not meet this standard. The Supreme Court noted that the patent system contemplates a basic quid pro quo: in exchange for the legal right to exclude others from his invention for a period of time, an inventor discloses his invention to the public. See Brenner, 383 U.S. at 534, 148 USPQ at 695. The Brenner Court held that the grant of patent rights to an applicant is justified only by disclosure of an invention with substantial utility -- a specific benefit in currently available form. Until the invention has been refined and developed to this point, the Court held, the applicant has not met his side of the bargain, and has not provided a disclosure sufficient to justify a grant of the right to exclude others. See id.

We reach the same conclusion in regard to appellants assertion that the nucleic acid depicted in SEQ ID NO: 1 is useful as a molecular marker or probe. It is not seen that the one data point which may be provided by using the uncharacterized nucleic acid molecule of SEQ ID NO: 1 as a molecular marker or probe represents a substantial use.

Appellants argue that ESTs have real world value as seen from the "growth of a multi-million dollar industry in the United States premised on the usefulness of ESTs." Appeal Brief, pages 19-21. Reliance is placed on paragraph 6 of the Wiegand declaration in support of this argument. Dr. Wiegand statements in this paragraph of his declaration refer to EST databases, clone sets and microarrays. Suffice it to say, the claims on appeal are not directed to EST databases, clone sets and/or microarrays. Again, it is not seen that the one data point which may be provided by using the

uncharacterized nucleic acid of SEQ ID NO: 1 in such devices represents a substantial use.

2. Enablement

There are two rationales set forth in the Examiner's Answer for this rejection. First, claims 1-3 are considered to be non-enabled "since the claimed invention is not supported by either a specific asserted utility or a well established utility for the set forth [in support of the § 101 rejection]. one skilled in the art clearly would not know how to use the claimed invention." Examiner's Answer, page 7. The examiner's second position focuses on claims 1 and 3 and their use of the transitional phrases "comprising" and "consisting essentially."

In regard to the first rationale, it appears that the rejection is simply a corollary of the finding of lack of utility. Thus, our conclusion with respect to the § 101 issue will also apply to this aspect of the § 112 (enablement) issue.⁹ On this basis we affirm the enablement rejection.

3. Written description

Only claims 1 and 3 are rejected under this section of the statute. The examiner has concluded that the use of the transitional phrases "comprising" and "consisting essentially of" in these claims results in appellants claiming an "astronomically large

⁹ Under these circumstances we need not reach the examiner's second rationale. However, we point out that the second rationale is premised upon an erroneous claim construction, i.e., the transitional phrases "comprising" and "consisting essentially of" are equivalent. If prosecution is resumed on this subject matter, the examiner should revisit the issue and construe "comprising" and "consisting essentially of" consistent with their well defined meanings. Also, as noted previously, the examiner did not make of record a fact-based analysis of the Wands factors. We urge the examiner in making any future enablement rejection, the rejection include an explicit analysis of the Wands factors.

genus of nucleic acid molecules" which are not "adequately describe[d]" by SEQ ID NO:

1. Examiner's Answer, page 10.

We do not find that this issue is ripe for review at this time and therefore decline to reach the merits of this rejection. The Appeal Brief was filed on January 31, 2001 and the Examiner's Answer was entered on August 6, 2001. Prior to the briefing in this appeal, the USPTO issued "Guidelines for Examination of Patent Applications under 35 U.S.C. § 112, ¶ 1 "Written Description" Requirement, 66 Fed. Reg. 1099 (Jan. 5, 2001) (Guidelines). Neither appellants nor the examiner discussed the Guidelines and determined what affect, if any, they may have on their respective positions. In addition, the Federal Circuit has recently considered written description issues involving claims directed to nucleotide sequences and their use in hybridization assays in Enzo Biochem, Inc. v. Gen-Probe, Inc., 296 F.3d 1316, 63 USPQ2d 1609 (Fed. Cir. 2002).

We believe a reasoned review of this rejection can only be performed after appellants and the examiner have had an opportunity to review the Guidelines and the court's opinion in Enzo. Since our affirmance of the utility rejection and the enablement rejection to the extent it is a corollary of the utility rejection constitutes a disposition of the appeal, we see no reason to remand the case for consideration of this issue now. Rather, if prosecution is resumed in this case, appellants and the examiner should revisit the issue and take into account the Guidelines and the guidance provided in Enzo.

This opinion contains a new ground of rejection pursuant to 37 CFR § 1.196(b). 37 CFR § 1.196(b) provides that, “A new ground of rejection shall not be considered final for purposes of judicial review.”

37 CFR § 1.196(b) also provides that appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (§ 1.197(c)) as to the rejected claims:

- (1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

- (2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED: 196(b)

**Bruce H. Stoner, Jr., Chief
Administrative Patent Judge**

William F. Smith
Administrative Patent Judge

Toni R. Scheiner
Administrative Patent Judge

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APPENDIX

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